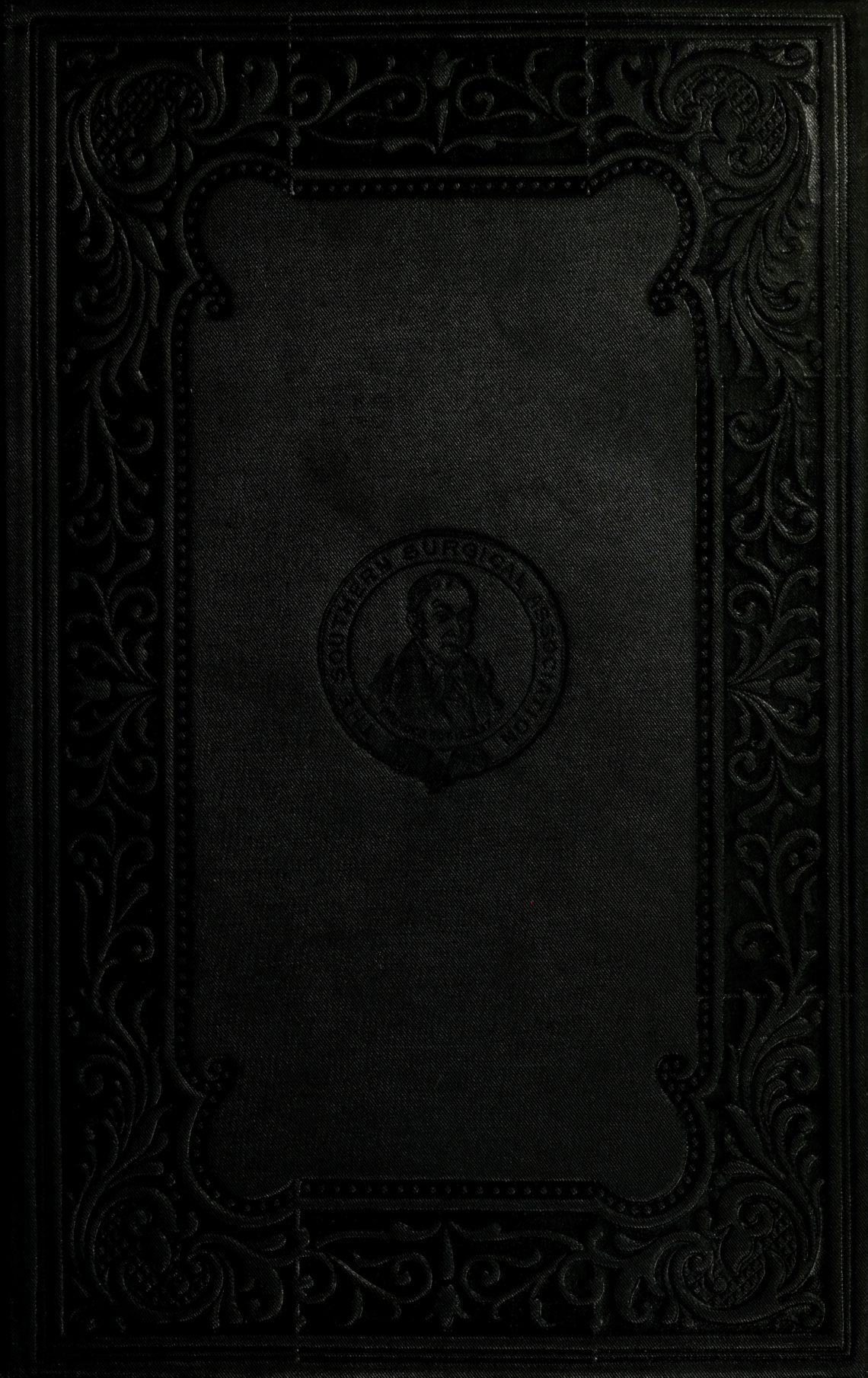

THE SOUTHERN SURGICAL ASSOCIATION

YALE SCHOOL OF MEDICINE
BRADY LAB. LIBRARY

TRANSFERRED TO
YALE MEDICAL LIBRARY
GENERAL MEDICAL LIBRARY

TRANSACTIONS

OF THE

SOUTHERN SURGICAL ASSOCIATION

VOLUME XXXI

THIRTY-FIRST SESSION

HELD AT BALTIMORE, MARYLAND

DECEMBER, 17, 18 AND 19, 1918

EDITED BY H. A. ROYSTER, M.D.

PUBLISHED BY THE ASSOCIATION

1919

The Association does not hold itself responsible for the views enunciated in the papers and discussions published in this volume.

H. A. ROYSTER, M.D., *Secretary,*
RALEIGH, N. C.

DORNAN, PRINTER
PHILADELPHIA

CONTENTS

Officers v
List of Officers from the Organization to the Present Time . vii
List of Meeting Places, with Dates and Presiding Officers . . viii
Honorary Fellows ix
Fellows xi
Geographical List of Fellows xxxiii
Constitution xli
By-Laws xliv
Minutes of the Thirty-first Annual Meeting xlvii

Address of the President. The Standardization of Rural Hospitals. By Isaac S. Stone, M.D. 1
Suture of Ruptured Kidney, with Report of a Case. By S. L. Ledbetter, Jr., M.D. 13
Ectopic or Pelvic Kidney. By E. S. Judd, M.D., and S. W. Harrington, M.D. 19
Prostatectomy, with its Preparatory and Postoperative Treatment. By Bransford Lewis, M.D. 29
Irritable Bladder in Women. By Charles A. L. Reed, M.D. . 46
Transplantation of the Appendix to Supply an Absent Urethra. By Charles M. Rosser, M.D. 59
A Gauze Sponge Spontaneously Expelled from the Urinary Bladder. By G. Paul La Roque, M.D. 64
Anuria after Unilateral Nephrectomy. By Louis Frank, M.D. 72
The Treatment of the Undescended or Maldescended Testis, with Particular Reference to End-results. A Report of 415 Cases. By William B. Coley, M.D. 79
Pancreatic Lymphangitis, with and without Jaundice. By John B. Deaver, M.D. 102
Stone in the Common Duct, with Analysis of Fifty Cases. By A. Murat Willis, M.D. 108
Malignant Papilloma of the Gall-bladder. By T. P. Waring, M.D. 116
Congenital Diverticula of the Intestines: Report of a Case of a Tumor Growing from the Tip of an Apparent Congenital Diverticulum in the Lower Sigmoid Region. By William T. Black, M.D. 121
Resection of the Cecum and Ascending Colon. By J. Shelton Horsley, M.D. 131

Practical Permanent Colostomies. By W. E. Sistrunk, M.D. 139
Notes on Two Signs in Chronic Appendicitis. By Robert T. Morris, M.D. 156
A Summary of the Surgical Treatment of Goitre. By Miles F. Porter, M.D. 160
Duodenal Fistula, with Case Report. By George A. Hendon, M.D. 169
Pathological Studies in the Recent Epidemics of Pneumonia. By William G. MacCallum, M.D. 180
Radium Demonstration at the Howard A. Kelly Hospital. By Howard A. Kelly, M.D., assisted by Curtis F. Burnam, M.D., and Walter Lantsberry 193
The Treatment of Hodgkin's Disease. By Curtis F. Burnam, M.D. 204
Treatment of Tumors of the Upper Jaw with the Cautery: A Preliminary Report. By Joseph Colt Bloodgood, M.D. . 210
Treatment of War Wounds in the Hospitals of the American Expeditionary Forces. By Col. Charles H. Peck, M.C. . . 227
Some Notes from the Examination of Five Thousand Selective Service Registrants. By Alexius McGlannan, M.D. . . 234
Mustard Gas Burns. By W. P. Carr, M.D. 243
Evacuation of the Wounded. By Col. Bailey K. Ashford . 253
The Art and Science of Surgery: Anesthesia and Asepsis, the Two Corner-stones in Our Æsculapian Temple. By Henry O. Marcy, A.M., M.D., LL.D. 259
Hand Method for Demonstrating the Mechanism of Labor and Types of Pelves. By John F. Moran, M.D. 288
Reconstruction of the Uterus. By Charles R. Robins, M.D. . 292
Ultimate Results in One Hundred Cases of Prolapsus Uteri. By John G. Clark, M.D., and Charles C. Norris, M.D. . . 299
Gynecological Pelvic Drainage: Its Indications, Methods and Materials. By J. Wesley Bovée, M.D. 325
Curettement before Suturing the Uterus in Cesarean Section, with a Report of Twelve Cases. By Gaston Torrance, M.D. . 332
Visceroptosis. By Charles Lybrand Bonifield, M.D. . . . 340
An Unusual Gunshot Injury of the Musculospiral Nerve. By Francis Reder, M.D. 355
Osteochondroma of the Ribs. By John C. A. Gerster, M.D. . 362
Polyposis of the Stomach. By D. C. Balfour, M.D. . . . 369

In Memoriam:
William M. Polk, M.D. 373
William P. Mathews, M.D. 377
James E. Moore, M.D. 379

OFFICERS FOR 1918–1919

PRESIDENT

JAMES E. THOMPSON, Galveston, Texas.

VICE-PRESIDENTS

CHARLES R. ROBINS, Richmond, Va.

GEORGE A. HENDON, Louisville, Ky.

SECRETARY

HUBERT A. ROYSTER, Raleigh, N. C.

TREASURER

GUY Le ROY HUNNER, Baltimore, Md.

COUNCIL

JOHN WESLEY LONG, Greensboro, N. C.

BACON SAUNDERS, Fort Worth, Texas.

THOMAS S. CULLEN, Baltimore, Md.

WILLIAM D. HAGGARD, Nashville, Tenn.

ISAAC S. STONE, Washington, D. C.

LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME.

* Deceased.

	President	*Vice-Presidents*	*Secretary*	*Treasurer*
1888.	*W. D. Haggard	R. D. Webb J. W. Sears	*W. E. B. Davis	Hardin P. Cochrane
1889.	*Hunter H. McGuire	W. O. Roberts *Bedford Brown	*W. E. B. Davis	Hardin P. Cochrane
1890.	*George J. Engelmann	*Berthold E. Hadra Duncan Eve	*W. E. B. Davis	Hardin P. Cochrane
1891.	Lewis S. McMurtry	*J. McFadden Gaston J. T. Wilson	*W. E. B. Davis	Hardin P. Cochrane
1892.	*J. McFadden Gaston	*Cornelius Kollock *George Ben Johnston	*W. E. B. Davis	Hardin P. Cochrane
1893.	*Bedford Brown	*Joseph Price George A. Baxter	*W. E. B. Davis	Hardin P. Cochrane
1894.	*Cornelius Kollock	A. B. Miles J. B. S. Holmes	*W. E. B. Davis	Hardin P. Cochrane
1895.	*Louis McLane Tiffany	Ernest S. Lewis *Manning Simons	*W. E. B. Davis	*Richard Douglas
1896.	Ernest S. Lewis	Joseph Taber Johnson *Richard Douglas	*W. E. B. Davis	*A. M. Cartledge
1897.	*George Ben Johnston	W. E. Parker Floyd W. McRae	*W. E. B. Davis	*A. M. Cartledge
1898.	*Richard Douglas	*H. H. Mudd James A. Goggans	*W. E. B. Davis	*A. M. Cartledge
1899.	Joseph Taber Johnson	F. W. Parham *W. L. Robinson	*W. E. B. Davis	*A. M. Cartledge
1900.	*A. M. Cartledge	*Manning Simons W. P. Nicolson	*W. E. B. Davis	W. D. Haggard
1901.	*Manning Simons	George H. Noble L. C. Bosher	W. D. Haggard	Floyd W. McRae
1902.	*W. E. B. Davis	J. Wesley Bovée J. W. Long	W. D. Haggard	Floyd W. McRae
1903.	J. Wesley Bovée	Christopher Tompkins Bacon Saunders	W. D. Haggard	Floyd W. McRae
1904.	Floyd W. McRae	George S. Brown J. Shelton Horsley	W. D. Haggard	Charles M. Rosser
1905.	Lewis C. Bosher	J. D. S. Davis I. S. Stone	W. D. Haggard	Charles M. Rosser
1906.	George H. Noble	Stuart McGuire E. Denegre Martin	W. D. Haggard	Charles M. Rosser
1907.	Howard A. Kelly	Rufus E. Fort Hubert A. Royster	W. D. Haggard	Charles M. Rosser
1908.	F. W. Parham	Henry D. Fry W. F. Westmoreland	W. D. Haggard	Stuart McGuire
1909.	Stuart McGuire	John Young Brown R. S. Cathcart	W. D. Haggard	Wm. S. Goldsmith
1910.	W. O. Roberts	Joseph C. Bloodgood Lewis C. Morris	W. D. Haggard	Wm. S. Goldsmith
1911.	Rudolph Matas	Guy L. Hunner J. Garland Sherrill	W. D. Haggard	Wm. S. Goldsmith
1912.	J. M. T. Finney	J. E. Thompson W. P. Carr	W. D. Haggard	Wm. S. Goldsmith
1913.	John Young Brown	*Ap Morgan Vance Lomax Gwathmey	W. D. Haggard	Le Grand Guerry
1914.	John W. Long	A. C. Scott James F. Mitchell	W. D. Haggard	Le Grand Guerry
1915.	Bacon Saunders	Thomas S. Cullen S. M. D. Clark	W. D. Haggard	Le Grand Guerry
1916.	Thomas S. Cullen	Robert S. Hill Willard Bartlett	W. D. Haggard	Le Grand Guerry
1917.	W. D. Haggard	J. Ernest Stokes F. R. Hagner	H. A. Royster	Le Grand Guerry
1918.	Isaac S. Stone	Le Grand Guerry Carey P. Rogers	H. A. Royster	Guy L. Hunner
1919.	James E. Thompson	Charles R. Robins George A. Hendon	H. A. Royster	Guy L. Hunner

LIST OF MEETING PLACES, WITH DATES AND PRESIDING OFFICERS

1888.	Birmingham,	William D. Haggard
1889.	Nashville,	Hunter H. McGuire
1890.	Atlanta,	George J. Engelmann
1891.	Richmond,	Lewis S. McMurtry
1892.	Louisville,	J. McFadden Gaston
1893.	New Orleans,	Bedford Brown
1894.	Charleston,	Cornelius Kollock
1895.	Washington,	Louis McLane Tiffany
1896.	Nashville,	Ernest S. Lewis
1897.	St. Louis,	George Ben Johnston
1898.	Memphis,	Richard Douglas
1899.	New Orleans,	Joseph Taber Johnson
1900.	Atlanta,	A. M. Cartledge
1901.	Richmond,	Manning Simons
1902.	Cincinnati	W. E. B. Davis
1903.	Atlanta,	J. Wesley Bovée
1904.	Birmingham,	Floyd W. McRae
1905.	Louisville,	Lewis C. Bosher
1906.	Baltimore,	George H. Noble
1907.	New Orleans,	Howard A. Kelly
1908.	St. Louis,	F. W. Parham
1909.	Hot Springs,	Stuart McGuire
1910.	Nashville,	William O. Roberts
1911.	Washington,	Rudolph Matas
1912.	Old Point,	John M. T. Finney
1913.	Atlanta,	John Young Brown
1914.	Asheville,	John W. Long
1915.	Cincinnati,	Bacon Saunders
1916.	White Sulphur Springs,	Thomas S. Cullen
1917.	St. Augustine	William D. Haggard
1918.	Baltimore,	Isaac S. Stone

HONORARY FELLOWS

Founder.—Cunningham, Russell M.	Ensley, Ala.
Founder.—Davis, John D. S.	Birmingham, Ala.
1894.—Foy, George	Dublin.
Founder.—Goggans, James A.	Alexander City, Ala.
1894.—Jacobs, Charles	Brussels.
1914.—Johnson, Joseph Taber	Cherrydale, Va.
1910.—Jones, Robert	Liverpool.
1910.—Lane, Arbuthnot	London.
1917.—Lewis, Ernest S.	New Orleans, La.
Founder.—Long, John Wesley	Greensboro N. C.
1917.—McMurtry, Lewis S.	Louisville, Ky.
1894.—Martin, A.	Berlin.
1902.—Maury, Richard B.	Memphis, Tenn.
1894.—Morisani, O.	Naples.
1910.—Morison, Rutherford	New-Castle-on-Tyne.
1910.—Moynihan, B. G. A.	Leeds.
1910.—Myles, Thomas, Sir	Dublin.
1894.—Pozzi, S.	Paris.
1910.—Robson, Mayo	London.
Founder.—Schilling, Nicholas	Cedar Bayou, Texas.
1910.—Stiles, H. J.	Edinburgh.
Founder.—Stone, Isaac S.	Washington, D. C.
Founder.—Hugh M. Taylor,	Richmond, Va.
1917.—Tuholske, Herman	St. Louis, Mo.

FELLOWS

1908.—Abell, Irvin, M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, Medical Department, University of Louisville; Visiting Surgeon, University Hospital, Louisville City Hospital, and St. Mary and Elizabeth Hospital. 1228 Second St., Louisville, Ky.

1911.—Allen, Carroll W., M.D. 1312 Louisiana Ave., New Orleans, La.

1915.—Baer, William Stevenson, F.A.C.S., A.B., M.D. Associate Professor, Orthopedic Surgery, Johns Hopkins University; Associate in Orthopedic Surgery in charge of Orthopedic Department, Johns Hopkins Hospital; Consulting Orthopedic Surgeon, Home for Incurables; Surgeon-in-chief, Children's Hospital; Visiting Orthopedic Surgeon, Union Protestant Infirmary, Hospital for Women of Maryland, and Robert Garrett Hospital for Children; Consulting Orthopedic Surgeon, Cambridge Hospital, Cambridge, Md. 4 West Madison Street, Baltimore, Md.

1917.—Bagley, Charles, Jr., A.B., M.D. Associate in Experimental Neurology Johns Hopkins University. 5 West Chase Street, Baltimore, Md.

1914.—Bailey, Fred. Warren, B.Sc., M.D. Assistant Professor of Surgery, St. Louis University School of Medicine; Associate Chief Surgeon, St. John's Hospital; Visiting Gynecologist, St. Louis City Sanitarium. 633 Metropolitan Building, St. Louis, Mo.

1905.—Baker, James Norment, M.D. Visiting Surgeon, St. Margaret's Hospital; Secretary of the Medical Association of the State of Alabama. 719 Madison Avenue, Montgomery, Alabama.

1916.—Balfour, Donald Church, M.D. Surgeon to St. Mary's Hospital. Rochester, Minn.

1903.—Balloch, Edward A., M.D. Professor of Surgery, Medical Department of Howard University; Surgeon to Freedmen's Hospital; Member American Academy of Medicine. 1511 Rhode Island Avenue, N. W., Washington, D. C.

1916.—Barksdale, John W., M.D. Winona, Miss.

1908.—Barr, Richard Alexander, M.D. Professor of Surgery and Clinical Surgery, Medical Department of Vanderbilt University; late Major of First Tennessee Infantry, U. S. A. First National Bank Building, Nashville, Tenn.

1905.—Barrow, David, M.D. Ex-President Kentucky State Medical Society. 148 Market Street, Lexington, Ky.

1905.—Bartlett, Willard, M.D. Surgeon to St. Anthony's Hospital. *Vice-President*, 1916. 4257 Washington Boulevard, St. Louis, Mo.

1901.—Baughman, Greer, M.D. Professor of Obstetrics, Medical College of Virginia; Visiting Obstetrician to the Virginia Hospital, Memorial Hospital, and Stuart Circle Hospital, Richmond, Virginia. 26 North Laurel Street.

1917.—Bell, Richard Phillip, B.A., M.D. Member of Staff, King's Daughters Hospital. Masonic Building, Staunton, Va.

1916.—Biggs, Montgomery Herman, M.D. Surgeon to Rutherford Hospital; Chief Surgeon C. C. and O. Railway. Rutherfordton, N. C.

1916.—Black, William T., M.D. Exchange Building, Memphis, Tenn.

1908.—Blair, Vilray Papin, A.M., M.D. Metropolitan Building, St. Louis, Mo.

1906.—Bloodgood, Joseph Colt, M.D. Associate Professor of Surgery, Johns Hopkins University; Associate Surgeon, Johns Hopkins Hospital; Surgeon to the Union Protestant Infirmary; Chief Surgeon to St. Agnes' Hospital. *Vice-President*, 1910. 904 North Charles Street, Baltimore, Md.

1901.—Boldt, Hermann J., M.D. Gynecologist to Post-Graduate Hospital, St. Mark's Hospital, German Polyclinic; Consulting Gynecologist to the Beth Israel Hospital and to St. Vincent's Hospital; Professor of Gynecology, Post-Graduate Medical School; Member of the Gynecological Society of Germany; Fellow of the American Gynecological Society; Fellow of the Royal Society of Medicine (London); ex-President of the New York Obstetrical Society; of the German Medical Society of New York; of the Section of Obstetrics of the New York Academy of Medicine. 39 East Sixty-first Street, New York, N. Y.

1902.—Bonifield, Charles Lybrand, M.D. Professor of Clinical Gynecology, Medical College of Ohio (Medical

Department University of Cincinnati); Member American Association of Obstetricians and Gynecologists; ex-President, Cincinnati Academy of Medicine; ex-President, Cincinnati Obstetrical Society. 409 Broadway, Cincinnati, Ohio.

1890.—Bosher, Lewis Crenshaw, M.D. Professor of Practice of Surgery and Clinical Surgery in the Medical College of Virginia; Visiting Surgeon to the Memorial Hospital; Member of American Surgical Association; Member of the American Association of Obstetricians and Gynecologists; Member of Association of American Anatomists; Member of American Urological Association; ex-President of Richmond Academy of Medicine and Surgery. *Vice-President,* 1901; *President,* 1905. 422 East Franklin Street, Richmond, Va.

1895.—Bovée, J. Wesley, M.D. Fellow of American Gynecological Society; President of Washington Obstetrical and Gynecological Society; ex-President Medical and Surgical Society of the District of Columbia; Honorary Fellow of Medical Society of Virginia; Professor of Gynecology of George Washington University, Washington, D. C.; Gynecologist to Providence, Columbia, and George Washington University Hospitals; Consulting Physician to St. Ann's Infant Asylum, and Attending Gynecologist to St. Elizabeth's Hospital for the Insane, Washington, D. C. *Vice-President,* 1902; *President,* 1903; Member of *Council,* 1903–1906. The Rochambeau, Washington, D. C.

1905.—Brown, John Young, M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital; President of the American Association of Obstetricians and Gynecologists, 1906. *Vice-President,* 1909; *President,* 1913. Metropolitan Building, St. Louis, Mo.

1908.—Bryan, Robert C., M.D. Professor of Genito-urinary Diseases, Medical College of Virginia; Visiting Surgeon to the Virginia Hospital. First and Main Streets, Richmond, Virginia.

1910.—Bryan, W. A., M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University; Professor of Oral Surgery, Dental Department, Vanderbilt University. 146 Eighth Avenue, N., Nashville, Tenn.

1913.—Buist, A. Johnston, M.D. Professor of Gynecology, Medical College of the State of South Carolina; Visiting Gynecologist, Roper Hospital. 279 Meeting Street, Charleston, S. C.

1907.—Burch, Lucius E., M.D. Professor of Gynecology, Vanderbilt University, Medical Department; Gynecologist, Nashville City Hospital; Captain and Surgeon, N. G. S. T. 706 Church Street, Nashville, Tenn.

1917.—Burnam, Curtis Field, A.B., M.D. Surgeon, Howard A. Kelly Hospital. 1418 Eutaw Place, Baltimore, Md.

1902.—Caldwell, C. E., A.M., M.D. Clinical Professor of Surgery and Associate Professor of Surgical Anatomy in Medical Department, University of Cincinnati; Surgeon to Cincinnati General Hospital. "The Livingstone," Seventh and Race Streets, Cincinnati, Ohio.

1910.—Caldwell, Robert, M.D. Professor of Surgical Anatomy, Vanderbilt University; ex-President of Nashville Academy of Medicine. 315 Jackson Building, Nashville, Tenn.

1906.—Cannaday, John Egerton, M.D. Former Surgeon-in-Charge to Sheltering Arms Hospital, Hansford, W. Va.; Fellow of the American Association of Obstetricians and Gynecologists; Non-resident Honorary Fellow of the Kentucky State Medical Society; Fellow of the West Virginia Medical Association, Virginia Medical Society, Tri-State Society of Virginia and the Carolinas, American Association of Railway Surgeons. 100 Capitol Street, Charleston, W. Va.

1904.—Carothers, Robert, M.D. Professor of Clinical Surgery, Medical College of Ohio, Medical Department, Cincinnati University; Surgeon to the Good Samaritan Hospital; 413 Broadway, Cincinnati, Ohio.

1903.—Carr, William P., M.D. Professor of Physiology and Professor of Clinical Surgery, Columbian University; Surgeon to the Emergency Hospital and University Hospital; Consulting Surgeon to the Washington Asylum Hospital and the Goverment Hospital for the Insane, Washington, D. C. *Vice-President*, 1912. 1418 L Street, N. W., Washington, D. C.

1899.—Cathcart, R. S., M.D. Professor of Abdominal Surgery, Medical College of the State of South Carolina; Surgeon-in-chief, Roper Hospital, Charleston, S. C.; Surgeon, Atlantic Coast Line Railway, Charleston Consolidated Railway and Lighting Co., The Citadel—the Military College of South Carolina, and the Confederate Home College, Charleston, S. C. *Vice-President*, 1909. 66 Hasell Street, Charleston, South Carolina.

1907.—Clark, John G., M.D. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital. 2017 Walnut Street, Philadelphia, Penna.

1907.—Clark, S. M. D., M.D. Professor of Gynecology and Clinical Obstetrics, Tulane Medical Department; Visiting Surgeon, Charity Hospital. 1435 Harmony Street, New Orleans, Louisiana.

1893.—Cocram, Henry S., M.D. 108 Baronne Street, New Orleans, La.

1908.—Coffey, Robert C., M.D. Secretary, Oregon State Board of Medical Examiners; Councillor, Oregon State Medical Association. Stevens Building, Portland, Oregon.

1909.—Cole, Herbert Phalon, M.D. Instructor in Gynecology and Clinical Diagnosis, Medical Department of the University of Alabama; Gynecologist to City Hospital of Mobile. 202 Conti Street, Mobile, Ala.

1916.—Coleman, Claude C., M.D. Professor of Oral Surgery and Anesthesia, Associate in Clinical Surgery, Medical College of Virginia; Attending Surgeon to Memorial and Virginia Hospitals. 200 W. Grace Street, Richmond, Va.

1902.—Coley, William B., M.D. Clinical Lecturer on Surgery, College of Physicians and Surgeons; Assistant Surgeon in Hospital for Ruptured and Crippled; Attending Surgeon to General Memorial Hospital; Fellow of the American Surgical Association, New York Surgical Society, and New York Academy of Medicine. 40 East Forty-first Street, New York, N. Y.

1914.—Cousins, William Lewis, M.D. Surgeon-in-Chief, St. Barnabas' Hospital; Consulting Surgeon, Maine General Hospital. 231 Woodford Street, Portland, Maine.

1916.—Cowden, Charles N., M.D. Surgeon to City Hospital; Gynecologist to St. Thomas' Hospital. Hitchcock Bldg., Nashville, Tenn.

1907.—Crawford, Walter W., M.D. Ex-President Southern Medical Association; ex-President Perry County Medical Society; ex-President Mississippi State Medical Association; Surgeon to South Mississippi Infirmary. Hattiesburg, Miss.

1902.—Crile, George W., M.D. Professor of Surgery, The School of Medicine of Western Reserve University; Visiting Surgeon to Lakeside Hospital. 1021 Prospect Avenue, Cleveland, Ohio.

1908.—Crisler, Joseph Augustus, M.D. Professor of Anatomy and Operative Surgery, College of Physcians and Surgeons, Memphis, Tennessee; Lecturer on Minor Surgery, Medical Department, University of Mississippi; ex-Member

of Mississippi State Board of Health and Medical Examiners; ex-Vice-President Mississippi State Medical Association and Tri-State Medical Association. Memphis Trust Building, Memphis, Tenn.

1917.—Cullen, Ernest K., M.B. Assistant Professor of Gynecology, Detroit College of Medicine and Surgery; Associate Surgeon in Gynecology, Harper Hospital. David Whitney Building, Detroit, Mich.

1906.—Cullen, Thomas Stephen, M.B. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Consultant in Abdominal Surgery, Church Home and Infirmary. Fellow of the American Gynecological Society; Honorary Member to La Societa Italiana Ostettricia Ginecologia, Rome; Corresponding Member of the Gesellschaft f. Geburtshülfe, Leipzig. *Vice-President*, 1915; *President*, 1916. 20 E. Eager Street, Baltimore, Maryland.

1907.—Danna, Joseph A., M.D. Chief Visiting Surgeon, Charity Hospital. Charity Hospital, New Orleans, Louisiana.

1910.—Davis, John Staige, M.D. Instructor in Surgery, Johns Hopkins University; Assistant Surgeon to the Out-Patient Department of Johns Hopkins Hospital; Visiting Surgeon to the Union Protestant Infirmary, Visiting Surgeon to the Church Home and infirmary. 1200 Cathedral Street, Baltimore, Md.

1900.—Deaver, John B., M.D. Surgeon-in-Chief to the Lankenau Hospital. 1634 Walnut Street, Philadelphia.

1896.—Doughty, W. H., M.D. Professor of Special Surgery and Surgical Pathology, Medical Department, University of Georgia; Chief Surgeon to Charleston and Western Carolina Railroad. 822 Greene Street, Augusta, Ga.

1914.—Downes, William Augustus, M.D. Assistant Professor of Clinical Surgery, Columbia University, College of Physicians and Surgeons; Attending Surgeon, General Memorial and Babies' Hospitals; Associate Attending Surgeon, St. Luke's Hospital and Hospital for Ruptured and Crippled. 37 West Seventy-first Street, New York, N. Y.

1916.—Du Bose, Francis Goodwin, M.D. Surgeon-in-Charge of Vaughan Memorial Hospital. Selma, Ala.

1890.—Earnest, John G., M.D. Professor of Clinical Gynecology, College of Physicians and Surgeons; formerly Professor of Gynecology, Southern Medical College; Visiting

Gynecologist to the Grady Hospital. 828 Candler Building, Atlanta, Ga.

1907.—Elbrecht, Oscar Herman, M.D. Visiting Surgeon, St. Louis City Hospital; Consulting Surgeon to St. Louis Maternity, Bethesda and Missouri Pacific Railroad Hospitals. 423 Metropolitan Building, St. Louis, Mo.

1891.—Elkin, William Simpson, M.D. Professor of Operative and Clinical Surgery, Atlanta College of Physicians and Surgeons; ex-President of the Atlanta Society of Medicine; Surgeon to Grady Hospital. 27 Luckie St., Atlanta, Ga.

1904.—Finney, J. M. T., M.D. Associate Professor of Surgery, Johns Hopkins University; Surgeon to Out-patients, Johns Hopkins Hospital. *President*, 1912. 1300 Eutaw Place, Baltimore, Md.

1917.—Fletcher, Marshall H., M.D. Chief of Staff, Asheville Mission Hospital; Surgeon Clarence Barker Memorial Hospital and Dispensary, Biltmore. 17 Church Street, Asheville, N. C.

1901.—Fort, Rufus E., M.D. Chief Surgeon, Nashville Terminal Company; Surgeon to Tennessee Central Railroad; Surgeon to Nashville Hospital; *Vice-President*, 1907. 209 Seventh Avenue, N., Nashville, Tenn.

1905.—Frank, Louis, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Visiting Surgeon to Louisville City Hospital. 400 Atherton Building, Louisville, Ky.

1916.—Frazier, Charles H., M.D. Professor of Clinical Surgery, University of Pennsylvania. 1724 Spruce Street, Philadelphia, Pa.

1902.—Freiberg, Albert H., M.D. Professor of Orthopedic Surgery in the Medical College of Ohio, Medical Department of the University of Cincinnati; Orthopedic Surgeon to the Cincinnati Hospital and to the Jewish Hospital of Cincinnati. 19 West Seventh Street, Cincinnati, Ohio.

1917.—Gerster, John C. A., M.D. Instructor in Operative Surgery, Cornell University Medical College. 34 East 75th St., New York, N. Y.

1917.—Gessner, Hermann B., A.M., M.D. Professor of Operative and Clinical Surgery in Tulane University; Chief Visiting Surgeon to Charity Hospital; Junior Surgeon to Touro Infirmary. 1105 Maison Blanche, New Orleans, La.

1913.—Gibbon, R. L., M.D. Charlotte, N. C.

1918.—Gilcreest, Edgar L., A.B., M.D. Gainesville, Texas.

1900.—Goldsmith, W. S., M.D. *Treasurer,* 1909–1912. 262 Jackson Street, Atlanta, Ga.

1892.—Grant, Horace H., M.D. Professor of Surgery in the Hospital College of Medicine; Surgeon to the Louisville City Hospital. 328 Atherton Building, Louisville, Ky.

1905.—Guerry, Le Grand, M.D. Surgeon, Columbia Hospital. *Treasurer,* 1913–1918. *Vice-President,* 1918. Columbia, S. C.

1896.—Gwathmey, Lomax, M.D. Attending Gynecologist to St. Vincent's Hospital and Dispensary, *Vice-President,* 1913. Norfolk, Va.

1896.—Haggard, William David, M.D. Professor of Surgery and Clinical Surgery, Vanderbilt University. Surgeon to St. Thomas' Hospital, Vanderbilt and City Hospitals. *Treasurer,* 1900; *Secretary,* 1901–1916; *President,* 1917. 706 Church Street, Nashville, Tenn.

1910.—Hagner, Francis Randall, M.D. Professor of Genito-urinary Surgery, George Washington University; Attending Genito-urinary Surgeon, George Washington University Hospital; Attending Surgeon, Garfield Memorial Hospital. *Vice-President,* 1917. The Farragut, Washington, D. C.

1892.—Hall, Rufus Bartlett, A.M., M.D. Professor of Clinical Gynecology in the Miami Medical College; Gynecologist to the Presbyterian Hospital; ex-President of the Cincinnati Obstetrical Society; ex-President of the American Association of Obstetricians and Gynecologists; Fellow of British Gynecological Society. 628 Elm Street, Cincinnati, O.

1910.—Hanes, Granville S., M.D. Professor of Surgery of the Rectum and Intestinal Diseases, Medical Department of the University of Louisville; Surgeon to the Louisville City Hospital. The Atherton Building, Louisville, Ky.

*1901.—Hazen, Charles M., Professor of Physiology, Medical College of Virginia. Bon Air (Richmond), Va.

1896.—Heflin, Wyatt, M.D. Ex-President of the Jefferson County Medical Society. Birmingham, Ala.

1917.—Helms, John Sullivan, A.B., M.D. Chief Surgeon, Tampa Children's Home; Associate Surgeon, Gordon Keller Memorial and Woman's Hospitals. Tampa, Fla.

1905.—Hendon, George A., M.D. Professor of Surgery and Clinical Surgery, University of Louisville. *Vice-President.* 968 Baxter Avenue, Louisville, Ky.

* Resigned.

1918.—Henson, James W., M.D. Associate Professor of Surgery, Medical College of Virginia; Member of Surgical Staff of Virginia and Memorial Hospitals; Surgeon to the Southern Railway. 405 N. Allen Avenue, Richmond, Va.

1889.—Hill, Robert Somerville, M.D. Gynecologist to the Laurel Hill Hospital; Senior Councillor of the Medical Association of the State of Alabama; ex-President of the Montgomery County Medical and Surgical Association; former Surgeon of the Second Regiment, Alabama State Militia. *Vice-President,* 1916. Montgomery, Ala.

1913.—Hodgson, Fred G., M.D. Assistant in Orthopedics, Atlanta Medical College; Orthopedic Surgeon, Wesley Memorial Hospital and MacVicar Hospital of Spelman Seminary; Junior Orthopedic Surgeon, Grady Memorial Hospital. 72 West Peachtree Street, Atlanta, Ga.

1911.—Hogan, Edgar P., M.D. Associate Professor of Gynecology and Abdominal Surgery, Graduate School of Medicine of the University of Alabama; Resident Surgeon and Gynecologist to the Hillman Hospital. 412–14 Empire Building, Birmingham, Ala.

1906.—Holden, Gerry R., M.D. Formerly House Surgeon, Roosevelt Hospital, New York City; formerly Resident Gynecologist, Johns Hopkins Hospital, and Assistant in Gynecology, Johns Hopkins Medical School. 223 West Forsyth Street, Jacksonville, Fla.

1900.—Horsley, John Shelton, M.D. Surgeon-in-Charge of St. Elizabeth's Hospital. *Vice-President,* 1904. 617 West Grace Street, Richmond, Va.

1903.—Hunner, Guy Le Roy, M.D. Associate in Gynecology, Johns Hopkins University; Professor of Genito-urinary Surgery, Woman's Medical College of Baltimore; Gynecologist-in-Chief, St. Agnes' Hospital; Visiting Gynecologist, Church Home and Hebrew Hospital, Baltimore, Frederick City Hospital, Frederick, Md., and Hagerstown Hospital, Hagerstown, Md.; Consulting Gynecologist, Brattleboro Memorial Hospital, Brattleboro, Vt. *Vice-President,* 1911. *Treasurer.* 2305 St. Paul Street, Baltimore, Md.

1900.—Ill, Edward Joseph, M.D. Surgeon to the Woman's Hospital; Medical Director, St. Michael's Hospital; Gynecologist and Supervising Obstetrician, St. Barnabas' Hospital; Consulting Gynecologist to German Hospital and Beth Israel Hospital of Newark, N. J., to All Souls' Hospital, Morristown,

N. J., and to Mountain Side Hospital, Montclair, N. J.; Vice-President from New Jersey to Pan-American Congress of 1893. 1002 Broad Street, Newark, N. J.

1912.—Jackson, William R., M.D. Professor of Surgery to the Medical Department of the University of Alabama; Consulting Surgeon to the City Hospital and Southern Infirmary, Mobile, Ala. 164 St. Michael Street, Mobile, Ala.

1908.—Jonas, Ernst, M.D. Clinical Professor of Surgery, Medical Department, Washington University; Chief of Surgical Clinic, Washington University Hospital; Gynecologist to the Jewish Hospital; Surgeon to the Martha Parsons Hospital for Children; Fellow of the American Association of Obstetricians and Gynecologists. 4495 Westminster Place, St. Louis, Missouri.

1910.—Jones, Edward Groves, A.B., M.D. Professor of Surgery, Medical Department, Emory University (Atlanta Medical College); Surgeon to Grady Memorial Hospital, Georgia Baptist Hospital and Wesley Memorial Hospital. 714 Hurt Building, Atlanta, Ga.

1902.—Jordan, William Mudd, M.D. 501 Woodward Building, Birmingham, Ala.

1912.—Judd, Edward Starr, M.D. Surgeon to St. Mary's Hospital, Rochester, Minn.

1890.—Kelly, Howard Atwood, M.D. Founder of Kensington Hospital, Philadelphia; Associate Professor of Obstetrics, University of Pennsylvania, 1888–89; Professor of Gynecology and Obstetrics, Johns Hopkins University, 1889–99; Professor of Gynecology, Johns Hopkins University; Gynecologist-in-Chief to Johns Hopkins Hospital; Member Associé Etranger de la Société Obstétricale et Gynécologique de Paris; Correspondirendes Mitglied der Gesellschaft f. Geburtshülfe zu Leipzig; Honorary Fellow, Edinburgh Obstetrical Society, Royal Academy of Medicine (Ireland), and British Gynecological Society; Member of Washington Academy of Sciences; Fellow of the American Gynecological Society. *President*, 1907. 1418 Eutaw Place, Baltimore, Maryland.

1917.—Kerr, Harry Hyland, M.D., C.M. Clinical Professor of Surgery, George Washington University Medical School; Attending Surgeon Garfield Memorial and Children's Hospitals; Associate Surgeon, Providence Hospital. 1742 N. St., N. W., Washington, D. C.

1907.—Kirchner, Walter C. G., M.D. Formerly Surgeon-in-Charge, St. Louis City Hospital. 508 Metropolitan Building, St. Louis, Mo

1899.—Kohlman, William, M.D. 3500 Prytania Street, New Orleans, La.

1913.—LaRoque, G. Paul, M.D. Associate Professor of Surgery, Medical College of Virginia; Surgeon, Memorial Hospital. 501 East Grace Street, Richmond, Va.

1914.—Landry, Lucian, M.D. Assistant Demonstrator in Operative Surgery and Instructor in Clinical Surgery, Tulane University of Louisiana, School of Medicine; Junior Surgeon, Touro Infirmary; Visiting Surgeon, Charity Hospital. 2255 St. Charles Avenue, New Orleans, La.

1916.—Law, Arthur Ayer, M.D. Associate Professor of Surgery, University of Minnesota Medical School and Mayo Foundation; Major, M. O. R. C. and Director, University of Minnesota Base Hospital, No. 26; Surgeon, University of Minnesota Hospital and University Hospital; Assistant Chief of University Hospital. Syndicate Building, Minneapolis, Minn.

1917.—Ledbetter, Samuel L., Jr., M.D. First National Bank Building, Birmingham, Ala.

1894.—Leigh, Southgate, M.D. Visiting Surgeon to St. Vincent's and Norfolk Protestant Hospitals; First Vice-President of Medical Society of Virginia, 1899-1900. 147 Granby Street, Norfolk.

1912.—Lewis, Bransford, M.D. Century Building, St. Louis, Mo.

1914.—Lewis, Dean, A.B., M.D. Associate Professor of Surgery, Rush Medical College; Attending Surgeon, Presbyterian Hospital; Consulting Surgeon, Anne W. Durand Hospital of the Memorial Institute for Infectious Diseases. 122 South Michigan Avenue, Chicago, Ill.

1900.—Lloyd, Samuel, M.D. Professor of Surgery, New York Post-Graduate Medical School; Attending Surgeon to the Post-Graduate Hospital and St. Francis' Hospital, and Consulting Surgeon to the Benedictine Sanitarium at Kingston, N. Y. 12 West Fiftieth Street, New York, N. Y.

1904.—Lupton, Frank A., M.D. 816 Woodward Building, Birmingham, Ala.

1902.—McAdory, Wellington P., M.D. Surgeon to Hillman Hospital. Birmingham, Ala.

1895.—McGannon, M. C., M.D. Professor of Surgery and Clinical Surgery, Medical Department, Vanderbilt University; Chief Surgeon, Woman's Hospital. 316 Doctors' Building, Nashville, Tenn.

1911.—McGlannan, Alexius, M.D. Associate Professor of Surgery, College of Physicians and Surgeons, Baltimore. 114 West Franklin St., Baltimore, Md.

1893.—McGuire, Stuart, M.D. Professor of the Principles of Surgery and Clinical Surgery, University College of Medicine; Surgeon-in-Charge, St. Luke's Hospital; Visiting Surgeon, Virginia Hospital; Consulting Surgeon, Virginia Home for Incurables. *Vice-President,* 1906; *Treasurer,* 1908; *President,* 1909. 518 East Grace Street, Richmond, Va.

1891.—McGuire, W. Edward, M.D. Professor of Gynecology, University College of Medicine; Gynecologist to the Virginia Hospital. 411 East Grace Street, Richmond, Va.

1888.—McRae, Floyd Wilcox, M.D. Professor of Gastro-intestinal, Rectal, and Clinical Surgery, Atlanta College of Physicians and Surgeons; Surgeon to Grady Hospital; ex-President Medical Association of Georgia; ex-Secretary of Section on Surgery and Anatomy, American Medical Association. *Vice-President,* 1897; *Treasurer,* 1901–1903; *President,* 1904. Peters Building, Atlanta, Ga.

1905.—MacLean, Henry Stuart, M.D. Professor of Pathology, University College of Medicine. 406 West Grace Street, Richmond, Va.

1915.—Maes, Urban, M.D. Assistant Professor of Clinical and Operative Surgery, Tulane University of Louisiana School of Medicine; Junior Surgeon, Charity Hospital and Touro Infirmary; Senior Surgeon, New Orleans Dispensary for Women and Children. 1671 Octavia Street, New Orleans, Louisiana.

1912.—Malone, Battle, M.D. 1701 Exchange Building, Memphis, Tenn.

1891.—Marcy, Henry Orlando, M.D., LL.D. Ex-President of the American Medical Association; President of the Section of Gynecology, Ninth International Medical Congress, late President of the American Academy of Medicine; Corresponding Member of the Medico-Chirurgical Society of Bologna, Italy; Fellow of the American Association of Obstetricians and Gynecologists. 180 Commonwealth Avenue, Boston, Mass.

1899.—Martin, E. Denegre, M.D. Professor of Surgery, Post-Graduate Department, Tulane Medical College; Visiting Surgeon to Charity Hospital. *Vice-President,* 1906. 741 Carondelet St., New Orleans, La.

1909.—Martin, Frank, M.D. Clinical Professor of Surgery at the University of Maryland. 1000 Cathedral Street, Baltimore, Md.

1913.—Martin, Franklin H., M.D. Professor of Gynecology, Post-Graduate School; Consulting Staff, St. Luke's Hospital. Editor, *Surgery, Gynecology and Obstetrics.* 30 North Michigan Avenue, Chicago, Ill.

1904.—Mason, J. M., M.D. Gynecologist to St. Vincent's Hospital. 1915 Sixteenth Avenue, S., Birmingham, Ala.

1899.—Mastin, William M., M.D. Fellow of the American Surgical Association; Member of the American Association of Genito-urinary Surgeons; Surgeon to the Mobile City Hospital. Joachim and Conti Streets, Mobile, Ala.

1893.—Matas, R., M.D. Professor of Surgery, Medical Department of Tulane University; Fellow of the American Surgical Association. *President,* 1911. 3523 Prytania St., New Orleans, La.

1917.—Maury, John M., M.D. Professor of Gynecology, University of Tennessee College of Medicine; Gynecologist, Memphis General and Baptist Memorial Hospitals. Bank of Commerce Building, Memphis, Tenn.

1902.—Mayo, Charles H., M.D. Attending Surgeon, St. Mary's Hospital; Fellow of American Surgical Association; ex-President, Western Surgical Association and of Minnesota State Medical Society. Rochester, Minn.

1888.—Miller, C. Jeff., M.D. Visiting Surgeon to Charity Hospital of Louisiana; Professor of Clinical Obstetrics and Clinical Gynecology in the Tulane University of Louisiana; Chief of the Division of Obstetrics, Gynecology and Abdominal Surgery of the Presbyterian Hospital. 1638 Joseph Street, New Orleans, La.

1916.—Miller, Edward Howe, Jr., M.D. Surgeon, Danville General Hospital; Assistant Surgeon, Southern Railway. 6 Chestnut Place, Danville, Va.

1917.—Miller, Robert Talbott, Jr., M.D. Professor of Surgery, University of Pittsburgh Medical School; Surgeon to Mercy Hospital. Diamond Bank Building, Pittsburgh, Pa.

1907.—Mitchell, James F., M.D. Surgeon to Providence Hospital. *Vice-President,* 1914. 1344 Nineteenth Street, Washington, D. C.

1901.—Mixter, Samuel Jason, M.D. Surgeon, Massachusetts General Hospital; Consulting Surgeon, Massachusetts Charity Eye and Ear Infirmary; Instructor of Surgery, Harvard Medical School. 180 Marlborough St., Boston, Mass.

1911.—Moore, John Thomas, M.D. Kress Medical Bldg., Houston, Texas.

1904.—Moran, John F., M.D. Professor of Obstetrics, Georgetown University; Obstetrician to Georgetown University Hospital and Columbia Hospital for Women. 2426 Pennsylvania Avenue, Washington, D. C.

1902.—Morris, Lewis C., M.D. Professor of Anatomy and Associate Professor of Gynecology, Birmingham Medical College; Councillor of Medical Association, State of Alabama. *Vice-President,* 1910. 1203–6 Empire Building, Birmingham, Ala.

1900.—Morris, Robert Tuttle, M.D. Professor of Surgery, New York Post-Graduate Medical School and Hospital. 616 Madison Avenue, New York, N. Y.

1916.—Murphy, Fred Towsley, M.D. 2248 Penobscot Building, Detroit, Mich.

1916.—Newell, E. Dunbar, M.D. Surgeon to the Newell and Newell Sanitarium; Consulting Surgeon to the Erlanger Hospital. Chattanooga, Tenn.

1889.—Nicolson, William Perrin, M.D. Professor of Anatomy and Clinical Surgery, Atlanta College of Physicians and Surgeons; Visiting Surgeon to Grady Hospital; Senior Surgeon to Wesley Memorial Hospital; Senior Surgeon, St. Joseph's Hospital. *Vice-President,* 1900. Healey Building, Atlanta, Ga.

1890.—Noble, George H., M.D. Dean and Professor of Abdominal Surgery and Clinical Gynecology, Atlanta School of Medicine; Gynecologist of Grady Hospital; Senior Gynecologist, Wesleyan Memorial Hospital, Atlanta; Fellow of the American Gynecological Association and the American Association of Obstetricians and Gynecologists; ex-President of the Medical Association of Georgia; ex-Secretary of the Section of Obstetrics, American Medical Association. *Vice-President,* 1901; *President,* 1906. 131 South Pryor Street, Atlanta, Ga.

1911.—Norris, Henry, M.D. Rutherfordton, N. C.

1901.—Ochsner, A. J., M.D. Adjunct Professor of Clinical Surgery, College of Physicians and Surgeons; Surgeon-in-Chief, Augustana and St. Mary's Hospital. 2106 Sedgwick Street, Chicago, Ill.

1903.—Ochsner, Edward H., M.D. Surgeon to Augustana and St. Mary's Hospital. 2106 Sedgwick Street, Chicago, Illinois.

1902.—Oliver, John Chadwick, M.D. Dean and Professor of Operative Surgery, Miami Medical College; Surgeon to the Cincinnati, Christ, and Presbyterian Hospitals. 628 Elm Street, Cincinnati, Ohio.

1888.—Parham, F. W., M.D. Professor of Surgery in the New Orleans Polyclinic. *Vice-President*, 1899; *President*, 1908. 1429 Seventh Street, New Orleans, La.

1910.—Payne, Robert Lee, M.D. Assistant Gynecologist to St. Vincent's Hospital; Surgeon to the Southern Railway; Consulting Surgeon to the Seaboard Air Line Railway. 300 Freemason St., Norfolk, Va.

1916.—Peck, Charles H., M.D. Professor of Clinical Surgery, Columbia University; Surgeon to Roosevelt Hospital. 30 W. Fiftieth Street, New York, N. Y.

1899.—Perkins, W. M., M.D. Chief of the Clinic Chair of General Clinical and Operative Surgery, New Orleans Polyclinic; Assistant Demonstrator of Operative Surgery, Medical Department, Tulane University of Louisiana; Visiting Surgeon to the Charity Hospital. 830 Canal Street, New Orleans, Louisiana.

1908.—Peterson, Reuben, A.M., M.D. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist-in-Chief to the University of Michigan Hospital. Ann Arbor, Mich.

1899.—Platt, Walter Brewster, M.D. Surgeon to the Robert Garrett Hospital for Children. 802 Cathedral Street, Baltimore, Md.

1917.—Pool, Eugene H., M.D. Clinical Professor of Surgery, Columbia University, College of Physicians and Surgeons; Attending Surgeon, New York Hospital. 107 East Sixtieth Street, New York, N. Y.

1900.—Porter, Miles F., M.A., M.D. Surgeon to Hope Hospital; Professor of Surgery, Indiana University School of Medicine. 47 West Wayne Street, Fort Wayne, Ind.

1916.—*Pryor, Stewart Wylie, M.D. Chief Surgeon to the Pryor Hospital; Chief Surgeon to C. and N. W. and L. and C. Railways; Division Surgeon to S. A. L. Railway. Chester, S. C.

1900.—Ransohoff, Joseph, M.D., F.R.C.S. Professor of Anatomy and Clinical Surgery, University of Cincinnati; Surgeon to Cincinnati, Good Samaritan, and Jewish Hospitals; Member of American Surgical Association. 19 West Seventh Street, Cincinnati, Ohio.

1911.—Reder, Francis, M.D. Surgeon, St. Louis City and St. John's Hospitals and Missouri Sanatorium. Delmar Building, St. Louis, Mo.

1890.—Reed, Charles Alfred Lee, M.D. Ex-President of the American Medical Association; Professor of Gynecology and Abdominal Surgery in the Cincinnati College of Medicine and Surgery; Surgeon to the Cincinnati Free Hospital for Women; Fellow of the American Association of Obstetricians and Gynecologists; Fellow of the British Gynecological Society; ex-Chairman of the Section on Obstetrics and Diseases of Women of the American Medical Association; Secretary-General of the Pan-American Medical Congress, 1893; Honorary Member of the Medical Society of the State of New York. 19 W. Seventh Street, Cincinnati, Ohio.

1914.—Rhodes, Goodrich Barbour, A.B., M.D. Assistant Clinical Professor of Surgery, Ohio-Miami Medical College of the University of Cincinnati; Junior Attending Surgeon, Cincinnati and Good Samaritan Hospitals and Episcopal Hospital for Children. 4 West Seventh Street, Cincinnati, Ohio.

1917.—Rhodes, Robert L., A.B., M.D. 1103–5 Lamar Building, Augusta, Ga.

1912.—Richardson, Edward P., M.D. Surgeon to Outpatients, Massachusetts General Hospital, and Surgeon to the Robert B. Brigham Hospital for Chronic Diseases. 224 Beacon Street, Boston, Mass.

1888.—Roberts, William O., M.D. Professor of Principles of Surgery and Clinical Surgery, Medical Department of the University of Louisville; formerly Secretary of the Surgical Section of the American Medical Association. *Vice-President*, 1889; *President*, 1910. Atherton Building, Louisville, Ky.

1901.—Robins, Charles Russell, M.D. Professor of Gynecology, Medical College of Virginia; Gynecologist to the Memorial Hospital; Surgeon to the Atlantic Coast Railroad. *Vice-President*. 8 West Grace Street, Richmond, Va.

* Deceased.

1917.—Robinson, Julian McG., M.D. 753 Main Street, Danville, Va.

1906.—Rogers, Carey Pegram, M.D. Chief of Surgical Staff, St. Luke's Hospital; Consulting Surgeon, Seaboard Air Line Railway. *Vice-President*, 1918. 221 Laura Street, Jacksonville, Florida.

1901.—Rogers, Mack, M.D. Professor of Anatomy, Birmingham Medical College. 212 Twentieth Street, Birmingham, Alabama.

1901.—Rosser, Charles M., M.D. Professor of Surgery, Baylor University, College of Medicine; Consulting Surgeon, Parland Hospital; Attending Surgeon, Texas Baptist Memorial Sanitarium; ex-Vice-President Texas State Medical Association; Vice-President, Tri-State Society of Texas, Louisiana, and Arkansas. *Treasurer*, 1904–07. 432 Gaston Avenue, Dallas, Texas.

1899.—Royster, Hubert Ashley, A.B., M.D. Surgeon to Rex Hospital; Surgeon-in-Chief, St. Agnes' Hospital; Surgeon to Southern Railway. *Vice-President*, 1907. *Secretary*. 423 Fayetteville Street, Raleigh, N. C.

1909.—Ruffin, Kirkland, M.D. Surgeon-in-Charge of St. Christopher's Hospital. 218 York Street, Norfolk, Va.

1908.—Russell, Wm. Wood, M.D. Associate Professor of Gynecology, Johns Hopkins University; Associate in Gynecology, Johns Hopkins Hospital; Gynecologist to Union Protestant Infirmary, Baltimore. 1208 Eutaw Place, Baltimore, Md.

1893.—Saunders, Bacon, M.D. Professor of Surgery and Clinical Surgery and Dean of Faculty of Medical Department, Fort Worth University; ex-President, Texas State Medical Association. *Vice-President*, 1903; *Member of Council*, 1908–1913. *President*, 1915. Flatiron Bldg., Fort Worth, Texas.

1907.—Scott, Arthur Carroll, M.D. Senior Surgeon, Temple Sanatorium. *Vice-President*, 1914. Temple, Texas.

1915.—Seelig, Major G., A.B., M.D. Professor of Surgery, St. Louis University School of Medicine; Attending Surgeon, Jewish and St. Louis City Hospitals; Chief of Surgical Out-Patient Department, Jewish Hospital. Wall Building, St. Louis, Mo.

1899.—Shands, A. R., M.D. Professor of Orthopedic Surgery in the Medical Department of the George Washington University and in the University of Vermont; Orthopedic Surgeon to the George Washington University Hospital, the

Emergency Hospital, and Central Dispensary; Charter Member, Washington Academy of Sciences; Member of American Orthopedic Association; and Honorary Member of Medical Society of Virginia. 901 Sixteenth Street, N. W., Washington, D. C.

1914.—Shands, Harley R., A.B., M.D. Visiting Surgeon, Mississippi State Charity and Baptist Hospitals. Century Building, Jackson, Miss.

1917.—Sherk, Henry H., M.D. Central Building, Pasadena, Cal.

1902.—Sherrill, J. Garland, M.D. Professor of Surgery and Clinical Surgery, University of Louisville; Consulting Surgeon to Louisville Hospital. *Vice-President,* 1911. Atherton Building, Louisville, Ky.

1900.—Simpson, Frank Farrow, M.D. Assistant Gynecologist, Mercy Hospital; Gynecologist to Out-patient Department, Mercy Hospital. Jenkins Arcade Bldg., Pittsburgh, Pa.

1913.—Simpson, James Knox, M.D. Attending Gynecologist, St. Luke's Hospital; Associate Gynecologist, Duval County Hospital, Jacksonville, Fla.

1917.—Sistrunk, W. E., M.D. Mayo Clinic, Rochester, Minnesota.

1899.—Smythe, Frank David, M.D. Gynecologist to St. Joseph's and City Hospitals; Professor of Gynecology, Didactic and Clinical, in the Memphis Hospital Medical College; ex-President West Tennessee Medical and Surgical Association; formerly Member of the Mississippi State Board of Health and State Board of Medical Examiners of Mississippi. Porter Building, Memphis, Tenn.

1916.—Souchon, Marion, M.D. House Surgeon, Hotel Dieu; Surgeon French Hospital; Assistant Professor of Clinical Surgery, Tulane University; Visiting Surgeon, Charity Hospital. Whitney Bank Bldg., New Orleans, La.

1904.—Stokes, James Ernest, M.D. *Vice-President,* 1917. Salisbury, N. C.

1918.—Stone, Harvey B., A.B., M.D. Instructor in Surgery, Johns Hopkins University; Associate Professor of Surgery, University of Maryland and College of Physicians and Surgeons; Member of Staff, Union Protestant Infirmary, Church Home and Infirmary, and Hebrew Hospital. 18 West Franklin St., Baltimore, Md.

1894.—Talley, Dyer F., M.D. Associate Professor of Surgery, Birmingham Medical College; Attending Surgeon

to Hillman Hospital; Surgeon to the Talley and McAdory Infirmary; ex-President of the Jefferson County Medical Society; Member of the Southern Medical Association; Member of the Pan-American Medical Association; Member of the Alumni Association of the Charity Hospital of Louisiana; Member of the Board of Censors of the Jefferson County Medical Society; Member of the Alabama State Board of Censors, Committee of Public Health and Examiners; Fellow of the American Association of Obstetricians and Gynecologists. 1801 Seventh Avenue, Birmingham, Ala.

1892. Thompson, J. E., M.D. Professor of Surgery in the University of Texas. *Vice-President,* 1912. *President.* Galveston, Tex.

1916.—Thorning, W. Burton, M.D. Chief Surgeon of the Gulf Coast Lines. Kress Building, Houston, Texas.

1908.—Torrance, Gaston, M.D. Member Surgical Staff Hillman Hospital; also the Sisters' Hospital and St. Vincent's; Fellow of the American Association of Obstetricians and Gynecologists. 328 Woodward Building, Birmingham, Ala.

1909.—Trout, Hugh Henry, M.D. Surgeon-in-Chief of Jefferson Surgical Hospital, Roanoke, Va. 1303 Franklin Road, Roanoke, Va.

1917.—Tupper, Paul Y., M.D. Clinical Professor of Surgery, Washington University Medical School; Visiting Surgeon St. Luke's Hospital; Consulting Surgeon, Missouri Baptist Sanitarium, Bethesda, Jewish and St. John's Hospitals, St. Louis Eye, Ear, Nose and Throat Infirmary. Wall Building, St. Louis, Mo.

1912.—Turck, Raymond C., M.D. Consolidated Building, Jacksonville, Fla.

1893.—Vander Veer, Albert, M.D. Professor of Clinical, Didactic, and Abdominal Surgery, Albany Medical College; ex-President of the American Surgical Association; ex-President of the American Association of Obstetricians and Gynecologists; ex-President of the Medical Society of the State of New York. 28 Eagle Street, Albany, New York.

1909.—Vaughan, George Tully, M.D. Professor of Surgery and Head of Department of Surgery in Georgetown University; Chief Surgeon in Georgetown University Hospital; Visiting Surgeon, Tuberculosis Hospital; Consulting Surgeon, St. Elizabeth's Hospital; Consulting Surgeon, Washington Asylum Hospital. 1718 I Street, Washington, D. C.

1912.—Walker, George, M.D. Associate in Surgery, Johns Hopkins University. 1 E. Centre St., Baltimore, Maryland.

1911.—Waring, T. P., M.D. Savannah, Ga.

1905.—Wathen, John R., A.B., M.D. Professor of Principles and Practice of Surgery and Clinical Surgery, University of Louisville; Surgeon to St. Anthony's, Louisville City, and University of Louisville Hospitals. 628 Fourth Avenue, Louisville, Ky.

1898.—Watkins, Isaac Lafayette, M.D. Ex-President of the Montgomery County Medical and Surgical Society. Montgomery, Ala.

1907.—Watts, Stephen H., M.D. Professor of Surgery University of Virginia; Surgeon-in-Chief and Director of the University of Virginia Hospital. University of Virginia, Charlottesville, Va.

1888.—Westmoreland, Willis F., M.D. Professor of Surgery, Atlanta College of Physicians and Surgeons. *Vice-President*, 1908. 241 Equitable Building, Atlanta, Ga.

1907.—Willis, A. Murat, M.D. Instructor in Abdominal Surgery, Medical College of Virginia; Junior Surgeon to Memorial Hospital, Richmond, Va. 405 East Grace Street, Richmond, Va.

1913.—Windell, James Tolbert, M.D. 715 West Jefferson Street, Louisville, Ky.

1905.—Winslow, Randolph, M.D., LL.D. Professor of Surgery, University of Maryland; Chief Surgeon, University Hospital; Consulting Surgeon, Hebrew Hospital, and to Hospital for Crippled Children. 1900 Mt. Royal Terrace, Baltimore, Md.

1905.—Witherspoon, T. Casey, M.D. Formerly Professor of Operative and Clinical Surgery, Medical Department, St. Louis University; Member of American Association of Anatomists. 307 West Granite Street, Butte, Mont.

1900.—*Wysor, John C., M.D. Surgeon-in-Charge, Chesapeake and Ohio Hospital. Clifton Forge, Va.

1900.—Young, Hugh H., M.D. Clinical Professor of Urology, Johns Hopkins University Medical Department. 330 North Charles Street, Baltimore, Md.

* Deceased.

1802.—Zinke, E. Gustav, M.D., F.A.C.S. Professor of Obstetrics and Clinical Midwifery in the Ohio-Miami Medical College, University of Cincinnati, 1896–1916; Emeritus Professor of Obstetrics, 1916; Honorary Chief of Staff and Obstetrician and Gynecologist to the German Hospital; President of the Cincinnati Obstetric Society, 1887; President, Academy of Medicine of Cincinnati, 1894; Member and Chairman of Section on Obstetics, Gynecology and Abdominal Surgery, American Medical Association, 1914; Fellow (and Secretary) of American Association of Obstetricians and Gynecologists; Honorary Member, Jackson County Medical Society, Kansas City, Mo.; Honorary Member, Cincinnati Obstetricians and Gynecologists, 1908. 4 West Seventh Street, Cincinnati, Ohio.

GEOGRAPHICAL LIST OF FELLOWS

ALABAMA

Baker, James Norment, 719 Madison Ave., Montgomery.
Cole, Herbert Phalon, 202 Conti St., Mobile.
Du Bose, Francis Goodwin, Selma.
Heflin, Wyatt, Birmingham.
Hill, Robert Somerville, Montgomery.
Hogan, Edgar P., 412–14 Empire Bldg., Birmingham.
Jackson, William R., 164 St. Michael St., Mobile.
Jordan, William Mudd, 501 Woodward, Bldg., Birmingham.
Ledbetter, Samuel L., Jr., First National Bank Bldg., Birmingham.
Lupton, Frank A., 816 Woodward Bldg., Birmingham.
McAdory, Wellington P., Birmingham.
Mason, J. M., 1915 Sixteenth Ave., S., Birmingham.
Mastin, William M., Joachim and Conti Sts., Mobile.
Morris, Lewis C., 1203–6 Empire Bldg., Birmingham.
Rogers, Mack, 212 Twentieth St., Birmingham.
Talley, Dyer F., 1801 Seventh Ave., Birmingham.
Torrance, Gaston, 328 Woodward Bldg., Birmingham.
Watkins, Isaac LaFayette, Montgomery.

CALIFORNIA

Sherk, Henry H., Central Building, Pasadena.

FLORIDA

Helms, John Sullivan, Tampa.
Holden, Gerry R., 223 W. Forsyth St., Jacksonville.
Rogers, Carey Pegram, 221 Laura St., Jacksonville.
Simpson, James Knox, Jacksonville.
Turck, Raymond C., Consolidated Bldg., Jacksonville.

GEORGIA

Doughty, W. H., 822 Greene St., Augusta.
Earnest, John G., 828 Candler Bldg., Atlanta.

Elkin, William Simpson, 27 Luckie St., Atlanta.
Goldsmith, W. S., 262 Jackson St., Atlanta.
Hodgson, Fred. G., 728 Candler Bldg., Atlanta.
Jones, Edward Groves, 714 Hurt Bldg., Atlanta.
McRae, Floyd Wilcox, Peters Bldg., Atlanta.
Nicolson, William Perrin, 1900 Healy Bldg., Atlanta.
Noble, George H., 131 S. Pryor St., Atlanta.
Rhodes, Robert L., 1103–5 Lamar Bldg., Augusta.
Waring, T. P., Savannah.
Westmoreland, Willis F., 241 Equitable Bldg., Atlanta.

ILLINOIS

Lewis, Dean D., 122 S. Michigan Ave., Chicago.
Martin, Franklin H., 30 North Michigan Ave., Chicago.
Ochsner, A. J., 2106 Sedgwick Street, Chicago.
Ochsner, Edward H., 2106 Sedgwick St., Chicago.

INDIANA

Porter, Miles F., 47 W. Wayne St., Fort Wayne.

KENTUCKY

Abell, Irvin, 1228 Second St., Louisville.
Barrow, David, 148 Market St., Lexington.
Frank, Louis, 400 Atherton Bldg., Louisville.
Grant, Horace H., 329 Atherton Bldg., Louisville.
Hanes, Granville S., Atherton Bldg., Louisville.
Hendon, George A., 968 Baxter Ave., Louisville.
Roberts, William O., Atherton Bldg., Louisville.
Sherrill, J. Garland, Atherton Bldg., Louisville.
Wathen, John R., 628 Fourth Ave., Louisville.
Windell, James T., 715 West Jefferson St., Louisville.

LOUISIANA

Allen, Carroll W., 1312 Louisiana Ave., New Orleans.
Clark, S. M. D., 1435 Harmony St., New Orleans.
Cocram, Henry S., 108 Baronne St., New Orleans.
Danna, Joseph A., Charity Hospital, New Orleans.
Gessner, Herman B., 1105 Maison Blanche Bldg., New Orleans.

Kohlman, William, 3500 Prytania St., New Orleans.
Landry, Lucian, 2255 St. Charles Ave.. New Orleans.
Maes, Urban, 1671 Octavia St., New Orleans.
Martin, E. Denegre, 741 Carondelet St., New Orleans.
Matas, Rudolph, 3523 Prytania St., New Orleans.
Miller, C. Jeff, 1638 Joseph St., New Orleans.
Parham, F. W., 1429 Seventh St., New Orleans.
Perkins, W. M., 830 Canal St., New Orleans.
Souchon, Marion, Whitney Bank Bldg., New Orleans.

MAINE

Cousins, William Lewis, 231 Woodford St., Portland.

MARYLAND

Baer, William S., 4 W. Madison St., Baltimore.
Bagley, Charles, Jr., 5 W. Chase St., Baltimore.
Bloodgood, Joseph C., 904 N. Charles St., Baltimore.
Burnam, Curtis Field, 1418 Eutaw Place, Baltimore.
Cullen, Thomas Stephen, 20 E. Eager St., Baltimore.
Davis, John Staige, 1200 Cathedral St., Baltimore.
Finney, J. M. T., 1300 Eutaw Place, Baltimore.
Hunner, Guy LeRoy, 2305 St. Paul St., Baltimore.
Kelly, Howard Atwood, 1418 Eutaw Place, Baltimore.
McGlannan, Alexius, 114 W. Franklin St., Baltimore.
Martin, Frank, 1000 Cathedral St., Baltimore.
Platt, Walter Brewster, 802 Cathedral St., Baltimore.
Russell, William Wood, 1208 Eutaw Place, Baltimore.
Stone, Harvey B., 18 West Franklin St., Baltimore.
Walker, George, 1 E. Centre St., Baltimore.
Winslow, Randolph, 1900 Mount Royal Terrace, Baltimore.
Young, Hugh H., 330 N. Charles St., Baltimore.

MASSACHUSETTS

Marcy, Henry Orlando, 180 Commonwealth Ave., Boston.
Mixter, Samuel Jason, 180 Marlborough St., Boston.
Richardson, Edward P., 224 Beacon St., Boston.

MICHIGAN

Cullen, Ernest K., David Whitney Bldg., Detroit.
Murphy, Fred T., 2248 Penobscot Building, Detroit.
Peterson, Reuben, Ann Arbor.

MINNESOTA

Balfour, Donald Church, Rochester.
Judd, Edward Starr, Rochester.
Law, Arthur Ayer, Syndicate Bldg., Minneapolis.
Mayo, Charles H., Rochester.
Sistrunk, W. E., Rochester.

MISSISSIPPI

Barksdale, John W., Winona.
Crawford, Walter W., Hattiesburg.
Shands, Harley R., Century Bldg., Jackson.

MISSOURI

Bailey, Fred W., 633 Metropolitan Bldg., St. Louis.
Bartlett, Willard, 4257 Washington Blvd., St. Louis.
Blair, Vilray Papin, Metropolitan Bldg., St. Louis.
Brown, John Young, Metropolitan Bldg., St. Louis.
Elbrecht, O. H., 423 Metropolitan Bldg., St. Louis.
Jonas, Ernst, 4495 Westminster Place, St. Louis.
Kirchner, Walter C. G., 508 Metropolitan Bldg., St. Louis.
Lewis, Bransford, Century Bldg., St. Louis.
Reder, Francis, Delmar Bldg., St. Louis.
Seelig, Major G., Wall Bldg., St. Louis.
Tupper, Paul Y., Wall Bldg., St. Louis.

MONTANA

Witherspoon, T. Casey, 307 West Granite Street, Butte.

NEW JERSEY

Ill, Edward Joseph, 1002 Broad St., Newark.

NEW YORK

Boldt, Herman J., 39 E. 61st St., New York City.
Coley, William B., 40 E. 41st St., New York City.
Downes, William Augustus, 37 W. 71st St., New York City.

Gerster, John C. A., 34 E. 75th St., New York City.
Lloyd, Samuel, 12 E. 50th St., New York City.
Morris, Robert Tuttle, 616 Madison Ave., New York City.
Peck, Charles H., 30 W. 50th St., New York City.
Pool, Eugene H., 107 E. 60th St., New York City.
Vander Veer, Albert, 28 Eagle St., Albany.

NORTH CAROLINA

Biggs, Montgomery Herman, Rutherfordton.
Fletcher, Marshall H., 17 Church St., Asheville.
Gibbon, R. L., Charlotte.
Norris, Henry, Rutherfordton.
Royster, Hubert Ashley, 423 Fayetteville St., Raleigh.
Stokes, James Ernest, Salisbury.

OHIO

Bonifield, Charles Lybrand, 409 Broadway, Cincinnati.
Caldwell, C. E., The Livingstone, 7th and Race Sts., Cincinnati.
Carothers, Robert, 413 Broadway, Cincinnati.
Crile, George W., 1021 Prospect Ave., Cleveland.
Freiberg, Albert H., 19 W. Seventh St., Cincinnati.
Hall, Rufus Bartlett, 628 Elm St., Cincinnati.
Oliver, John Chadwick, 628 Elm St., Cincinnati.
Ransohoff, Joseph, 19 W. 7th St., Cincinnati.
Reed, Charles Alfred Lee, 19 W. 7th St., Cincinnati.
Rhodes, Goodrich Barbour, 4 W. Seventh St., Cincinnati.
Zinke, E. Gustav, 4 W. Seventh St., Cincinnati.

OREGON

Coffey, Robert C., Stevens Building, Portland.

PENNSYLVANIA

Clark, John G., 2017 Walnut St., Philadelphia.
Deaver, John B., 1634 Walnut St., Philadelphia.
Frazier, Charles H., 1724 Spruce St., Philadelphia.
Miller, Robert Talbott, Jr., Diamond Bank Bldg., Pittsburgh.
Simpson, Frank Farrow, Jenkins Arcade Bldg., Pittsburgh.

SOUTH CAROLINA

Buist, A. Johnston, 279 Meeting Street, Charleston.
Cathcart, R. S., 66 Hasell St., Charleston.
Guerry, Le Grand, Columbia.
*Pryor, Stewart Wylie, Chester.

TENNESSEE

Barr, Richard Alexander, First National Bank Bldg., Nashville.
Black, William T., Exchange Bldg., Memphis.
Bryan, W. A., 146 Eighth Ave., N., Nashville.
Burch, Lucius E., 706 Church St., Nashville.
Caldwell, Robert, 315 Jackson Bldg., Nashville.
Cowden, Charles N., Hitchcock Bldg., Nashville.
Crisler, Joseph Augustus, Memphis Trust Bldg., Memphis.
Fort, Rufus E., 209 Seventh Ave., N., Nashville.
Haggard, William David, 706 Church St., Nashville.
McGannon, M. C., 118 Eighth Ave., N., Nashville.
Malone, Battle, 1701 Exchange Bldg., Memphis.
Maury, John M., Bank of Commerce Bldg., Memphis.
Newell, E. Dunbar, Chattanooga.
Smythe, Frank David, Porter Bldg., Memphis.

TEXAS

Gilcreest, Edgar L., Gainesville.
Moore, John Thomas, Kress Bldg., Houston.
Rosser, Charles M., 432 Gaston Ave., Dallas.
Saunders, Bacon, Flatiron Bldg., Fort Worth.
Scott, Arthur Carroll, Temple.
Thompson, J. E., Galveston.
Thorning, W. Burton, Kress Bldg., Houston.

VIRGINIA

Baughman, Greer, 26 N. Laurel St., Richmond.
Bell, Richard Phillip, Masonic Bldg., Staunton.
Bosher, Lewis Crenshaw, 422 E. Franklin St., Richmond.
Bryan, Robert C., First and Main Sts., Richmond.
Coleman, Claude C., 200 W. Grace St., Richmond.
Gwathmey, Lomax, Norfolk.

* Deceased.

*Hazen, C. M., Bon Air (Richmond).
Henson, J. W., Richmond.
Horsley, John Shelton, 617 W. Grace St., Richmond.
La Roque, G. Paul, 501 East Grace St., Richmond.
Leigh, Southgate, 147 Granby St., Norfolk.
McGuire, Stuart, 518 E. Grace St., Richmond.
McGuire, W. Edward, 411 E. Grace St., Richmond.
MacLean, Henry Stuart, 406 W. Grace St., Richmond.
Miller, Edward Howe, Jr., 6 Chestnut Place, Danville.
Payne, Robert Lee, 300 Freemason St., Norfolk.
Robins, Charles Russell, 8 W. Grace St., Richmond.
Robinson, Julian McG., 753 Main St., Danville.
Ruffin, Kirkland, 218 York St., Norfolk.
Trout, Hugh Henry, 1303 Franklin Road, Roanoke.
Watts, Stephen H., Charlottesville.
Willis, A. Murat, 405 E. Grace St., Richmond.
†Wysor, John C., Clifton Forge.

WEST VIRGINIA

Cannaday, John Egerton, 100 Capitol St., Charleston.

WASHINGTON, D. C.

Balloch, Edward A., 1511 Rhode Island Ave., N. W.
Bovée, J. Wesley, The Rochambeau.
Carr, William P., 1418 L. Street, N. W.
Hagner, Francis Randall, The Farragut.
Kerr, Harry Hyland, 1742 N Street, N. W.
Mitchell, James F., 1344 Nineteenth St.
Moran, John F., 2426 Pennsylvania Ave.
Shands, A. R., 901 Sixteenth Street, N. W.
Vaughan, George Tully, 1718 I St.

* Resigned. † Deceased.

CONSTITUTION

ARTICLE I

The name of this Association shall be THE SOUTHERN SURGICAL ASSOCIATION.

ARTICLE II

The object of this Association shall be to further the study and practice of Surgery in its various departments, especially among the profession of the Southern States.

ARTICLE III

SECTION 1. The qualifications which must be possessed by an applicant for fellowship in the Association shall be: (*a*) Good standing in his State Association; (*b*) experience covering not less than ten years of professional work; (*c*) practice limited essentially to surgery or one of its specialties; (*d*) recommendation by three Fellows, two preferably from his own State.

SECTION 2. Application for Fellowship shall be filed with the Secretary on the blank form provided for that purpose. The Council at each annual session shall carefully consider all candidates and may nominate one for each vacancy that exists on the roll for election or rejection by the Association.

ARTICLE IV

The Honorary Fellows of the Association shall not exceed twenty-five in number. They shall be nominated by the Council and elected by the Association. They will not be required to pay any dues and shall enjoy all the privileges of other Fellows except that of voting or holding office; this exception does not apply to Founders.

ARTICLE V

SECTION 1. The officers of this Association shall be a President, two Vice-Presidents, a Secretary, a Treasurer, and a Council, elected by ballot.

SEC. 2. The President and Vice-Presidents shall be elected for one year, and the President shall not be eligible for reëlection at any time; the Secretary and Treasurer, each, for five years; and the Council as provided for in the By-laws.

ARTICLE VI

SECTION 1. It shall be the duty of the President to preside at all meetings of the Association; to give the casting vote; to see that the rules of order and decorum be properly enforced in all deliberations of the Association; to sign the approved proceedings of each meeting, and to approve such orders as may be drawn upon the Treasurer for expenditures ordered by the Association.

SEC. 2. In the absence of the President the first Vice-President shall preside, and in his absence the second Vice-President shall preside.

SEC. 3. In the absence of all three, the Association shall elect one of its Fellows to preside *pro tem.*

SEC. 4. It shall be the duty of the Secretary to keep a true and correct record of the proceedings of the meetings; to preserve all books, papers, and articles belonging to the archives of the Association; to attest all orders drawn on the Treasurer for moneys appropriated by the Association; to keep the account of the Association with its Fellows; to keep a register of the Fellows, with the dates of their admission and places of residence. He shall collect all moneys due from the Fellows and pay to the Treasurer, taking his receipt for the same. He shall report such unfinished business of previous meetings as may appear on his books requiring action, and attend to such other business as the Association may direct. He shall also supervise and conduct all the correspondence of the Association, and edit the TRANSACTIONS under the direction of the Council.

SEC. 5. It shall be the duty of the Treasurer to keep a correct record of all moneys received from the hands of the Secretary, giving his receipt for the same; pay them out by order of the Association as indorsed by the President and attested by the seal in the hands of the Secretary.

Sec. 6. It shall be the duty of the President of the Association to appoint an Auditing Committee, consisting of three Fellows of the Association, whose duty it shall be to examine the books of the Secretary and Treasurer, and report on the same on the last day of the session.

ARTICLE VII

Vacancies occurring in the offices of the Association shall be filled by appointment of the President until the next meeting. He shall also have the appointment of all committees not otherwise provided for.

ARTICLE VIII

This Constitution shall take effect immediately from the time of its adoption, and shall not be amended except by a written resolution, which shall lie over one year, and receive a vote of two-thirds of the members present.

ARTICLE IX

The Fellowship of the Association shall be limited to two hundred.

BY-LAWS

ARTICLE I

The Southern Surgical Association shall meet annually on the Tuesday of the week preceding the week in which Christmas occurs, at 10 A.M., at such place as may be designated at the preceding meeting.

ARTICLE II

The Fellows present shall constitute a quorum for business.

ARTICLE III

The annual dues of each Fellow shall be $15, paid in advance.

ARTICLE IV

The usual parliamentary rules governing deliberative bodies shall govern the business workings of this Association.

ARTICLE V

All questions before the Association shall be determined by a majority of the votes present.

ARTICLE VI

The President shall deliver an annual address at each meeting of the Association.

ARTICLE VII

The Secretary of the Association shall receive at each annual Session a draft from the President, drawn on the Treasurer, for such sum as may be voted him by the Council, for services rendered the Association, and to this shall be added the necessary expense incurred in the discharge of his official duties.

ARTICLE VIII

It shall be the duty of the Secretary, one month prior to the annual meeting, to notify the Fellows of the Association and urge their attendance.

ARTICLE IX

The authors of papers shall notify the Secretary, six weeks prior to the meeting, of the titles of their essays, so that they may be incorporated in the preliminary programme.

ARTICLE X

COUNCIL

The Council shall consist of five members; and of those elected at the primary meeting, the first shall serve five years, the second four, and the third three, the fourth two, and the fifth one year; so that subsequently one member of the Council shall be elected annually to serve five years. No member of the Council shall be eligible for reëlection. The President and Secretary shall be *ex-officio* members of the Council.

This Council shall organize by electing a Chairman and Secretary, and shall keep a record of its proceedings.

The duties of this Council shall be—

1. To investigate applications for membership and report to the Association the names of such persons as are deemed worthy.

2. To take cognizance of all questions of an ethical, judicial, or personal nature, and upon these the decision of the Council shall be final; *provided,* that appeal may be taken from such decision of the Council to the Association, under a written protest, which protest shall be sustained by the Association, and the matter shall then be referred to a special committee, with power to take final action.

3. All motions and resolutions before the Association shall be referred to the Council without debate, and it shall report by recommendation at as early an hour as possible.

ARTICLE XI

The President shall appoint at each annual meeting a Committee of Arrangements.

ARTICLE XII

The Council shall have full power to omit from the published TRANSACTIONS, in part or in whole, any paper that may be referred to it by the Association, unless specially instructed to the contrary by the Association, which will be determined by vote.

ARTICLE XIII

The Council shall have power to drop from the roll of Fellows any member who fails to pay his dues for more than one year, or misses three consecutive sessions of the Association, or who for any reason fails to retain his good standing in his State association.

ARTICLE XIV

No paper shall be read before this Association which does not deal strictly with a subject of surgical or gynecological importance.

ARTICLE XV

No paper read before this Association shall be published in any medical journal or pamphlet for circulation, as having been read before the Association, without having received the endorsement of the Council.

ARTICLE XVI

The readings of papers shall be limited to twenty minutes each, except by permission of the Association.

MINUTES OF THE PROCEEDINGS

AT THE

THIRTY-FIRST ANNUAL MEETING

OF THE

SOUTHERN SURGICAL ASSOCIATION

HELD AT THE

HOTEL BELVEDERE

Baltimore, Maryland

DECEMBER 17, 18 AND 19, 1918

THIRTY-FIRST ANNUAL MEETING

FIRST DAY, *Tuesday, December* 17, 1918

The following named members were present:

BALLOCH, EDWARD A. . . . . Washington, D. C.
BLACK, WILLIAM T. . . . . Memphis, Tenn.
BLOODGOOD, JOSEPH COLT . . . . . Baltimore, Md.
BOLDT, HERMANN J. . . . . New York, N. Y.
BONIFIELD, CHARLES LYBRAND . . Cincinnati, O.
BOSHER, LEWIS CRENSHAW . . . . . Richmond, Va.
BOVÉE, J. WESLEY . . . . . Washington, D. C.
BRYAN, ROBERT C. . . . . Richmond, Va.
BURNAM, CURTIS FIELD . . . . . Baltimore, Md.
CAROTHERS, ROBERT . . . . . Cincinnati, O.
CARR, WILLIAM P. . . . . Washington, D. C.
CLARK, JOHN G. . . . . Philadelphia, Pa.
COLEMAN, CLAUDE C. . . . . Richmond, Va.
COLEY, WILLIAM B. . . . . New York, N. Y.
CULLEN, THOMAS STEPHEN . . . . . Baltimore, Md.
DAVIS, JOHN STAIGE . . . . . Baltimore, Md.
DOUGHTY, W. H. . . . . Augusta, Ga.
DOWNES, WILLIAM AUGUSTUS . . . New York, N. Y.
FRANK, LOUIS . . . . . Louisville, Ky.
FREIBERG, ALBERT H. . . . . Cincinnati, O.
GERSTER, JOHN C. A. . . . . New York, N. Y.
GIBBON, R. L. . . . . Charlotte, N. C.
GOLDSMITH, W. S. . . . . Atlanta, Ga.
GRANT, HORACE H. . . . . Louisville, Ky.
GUERRY, LE GRAND . . . . . Columbia, S. C.
HAGNER, FRANCIS RANDALL . . . . . Washington, D. C.
HALL, RUFUS BARTLETT . . . . . Cincinnati, O.
HELMS, JOHN SULLIVAN . . . . . Tampa, Fla.
HENDON, GEORGE A. . . . . Louisville, Ky.
HORSLEY, JOHN SHELTON . . . . . Richmond, Va.
HUNNER, GUY LE ROY . . . . . Baltimore, Md.

Ill, Edward Joseph.....Newark, N. J.
Jonas, Ernst.....St Louis, Mo.
Kelly, Howard Atwood.....Baltimore, Md.
Kohlman, William.....New Orleans, La.
LaRoque, G. Paul.....Richmond, Va.
Ledbetter, Samuel L., Jr.....Birmingham, Ala.
Leigh, Southgate.....Norfolk, Va.
Lewis, Bransford.....St. Louis, Mo.
McAdory, Wellington P.....Birmingham, Ala.
McGlannan, Alexius.....Baltimore, Md.
MacLean, Henry Stuart.....Richmond, Va.
Marcy, Henry Orlando.....Boston, Mass.
Miller, C. Jeff.....New Orleans, La.
Mixter, Samuel Jason.....Boston, Mass.
Moore, John Thomas.....Houston, Texas.
Moran, John F.....Washington, D. C.
Morris, Lewis C.....Birmingham, Ala.
Morris, Robert Tuttle.....New York, N. Y.
Oliver, John Chadwick.....Cincinnati, O.
Payne, Robert Lee.....Norfolk, Va.
Peck, Charles H.....New York, N. Y.
Porter, Miles F.....Fort Wayne, Ind.
Reder, Francis.....St. Louis, Mo.
Reed, Charles Alfred Lee....Cincinnati, O.
Rhodes, Robert L.....Augusta, Ga.
Robins, Charles Russell.....Richmond, Va.
Rogers, Carey Pegram.....Jacksonville, Fla.
Rosser, Charles M.....Dallas, Texas.
Royster, Hubert Ashley.....Raleigh, N. C.
Russell, William Wood.....Baltimore, Md.
Seelig, Major G.....St. Louis, Mo.
Shands, A. R.....Washington, D. C.
Sistrunk, W. E.....Rochester, Minn.
Stone, Isaac S.....Washington, D. C.
Thompson, J. E.....Galveston, Texas.
Waring, T. P.....Savannah, Ga.
Wathen, John R.....Louisville, Ky.
Watts, Stephen H.....Charlottesville, Va.
Willis, A. Murat.....Richmond, Va.
Winslow, Randolph.....Baltimore, Md.

Morning Session. The Association met in the Assembly Hall of the Hotel Belvedere, and was called to order at 10 A.M. by Vice-President Dr. Carey P. Rogers, Jacksonville, Florida, in the temporary absence of the President.

Dr. Guy Le Roy Hunner, Chairman of the Committee of Arrangements, made the following announcements: I think the program gives you a fairly full list of all the doings and the hours for the same, so that there is no need of going over the matters in detail.

Today immediately after this session we meet at the Maryland Club from 1 to 2 P.M., and the Baltimore men will have their automobiles and the automobiles of some of their friends ready to take the members of the Association to Fort McHenry, where we will be received by Colonel H. S. Purnell, and after clinics and demonstrations at the U. S. Army General Hospital, No. 2, we will partake of a buffet supper as the guests of Colonel Purnell and his staff.

We men of Baltimore are glad to have you with us. I do not know whether you know the inside history of this meeting or not, but with the war conditions which prevailed, now so happily changed, at first we were very much inclined to back down and not attempt to hold a meeting; but our Secretary, with his good stiff lower jaw, was rather insistent that the Southern Surgical Association should not miss one of its annual meetings, and finally he led us out in the light, and we are delighted that he spoke to us in the way he did.

I believe it is customary for the Chairman of the Committee of Arrangements to listen to all kicks, but I think I have more than supplied a good substitute, and I am sure you will be glad to hear from one of our former members. We regret exceedingly that his work has been such that he was obliged to resign from the Southern Surgical Association; but he has been with us in spirit in making arrangements for this meeting, and wishes to do all he can to contribute to the success of the meeting. I am sure you will be glad to hear from the Dean of the Johns Hopkins Medical School, Dr. J. Whitridge Williams.

Address of Welcome by Dr. Williams

On behalf of the Baltimore Fellows of this Association and of the medical profession of Maryland, I bid you a most

hearty welcome to this city. We are very glad to have you here, and we hope you will have an extremely enjoyable time, both from a scientific as well as from a social standpoint.

Baltimore has the reputation, more or less generally, of being hospitable, and I am sorry conditions incident to the war are such that at this time they put a brake on us, so that there is some danger of abrogating this reputation for hospitality; and we cannot entertain you as lavishly as we would like to do. It is not altogether our fault. We still extend to you the heartiest welcome.

The mere name of this Association has a great attraction for those who were born in Maryland. Anything southern appeals to us, and the fact that this is the Southern Surgical Association makes you feel at home. It is a singular thing about this Association, that while it is southern in name, its membership is not limited to southern men, and the other day I went over the list of Fellows and found that practically one-fourth of the Fellows are not from the south. It is gratifying to southern men to have this admixture.

The last time the Association met here was in 1906, that is, twelve years ago, and in that time many changes have occurred. It seems a very short time to some of us who remember that meeting very vividly, but when we think of what has occurred in the meantime, it seems a long time. We have gone through many changes; the Association itself has changed, and has even changed its name, and it has deleted the word "gynecological" from its title. In the next place, a very considerable change has occurred in the membership, and I happened to look over the minutes of the Baltimore meeting and found eighty-three members were present on that occasion. According to the present list of members, more than one-quarter of the list at that time has disappeared, some of them by death, some by resignation, and so on, and it is fitting on this occasion to recall some of the men who were here twelve years ago, and the first man we think of is George Ben Johnston, of Richmond, Virginia, a staunch friend and ardent supporter of this Association. We all miss his genial presence. And then we go to the other side of the country and think of Maurice Richardson, of Boston, who made a deep impression on us, and he has likewise departed. We had at that meeting Joseph Price from the middle part of the country. It is unnecessary for me to go over the

names of others, but what I have said shows the changes which have occurred when we recall some of the names of those who have gone.

I take it, probably the most striking thing about this meeting, and a thing you will remember most is, that this meeting occurs after the great war, and it brings us face to face with many problems which we shall have to consider in the future. The first consideration it brings up is the absence of many of our Fellows in France. We wish the Baltimore Fellows who are in France were here to welcome you and to take part in your deliberations. The question the war brings up is very important, and that is, What is going to happen to medicine with the great changes which have occurred in Germany? One does not have to be a pro-German to say that we owe the greatest obligations to Germany for many things. Personally, I am indebted to some of the men in Germany of thirty years ago for a great part of what I am, and it brings up these questions.

When I was a student in Leipsic, twenty-five years ago, I heard Professor Thiersch make the remark, "I will give America twenty-five years to lead the world in medicine," and I said, "How in the world can you say that?" He was perfectly conscientious and based his statement on this fact: "There are only two sets of people in the world without prejudice, namely, the Americans and the Russians." He said: "The Germans are prejudiced. They do not care very much for the French, and the French dislike the Germans and rarely speak to them." Again, he said: "The Germans are prejudiced in that they not only do not like the English and French, but they do not like themselves very much." In the Vienna school, the Berlin school, the Breslau school, and in every locality men object to the men in some other location, and he said: "You Americans are the only people that have no prejudices except perhaps the Russians. You come over here; you see what is good; you take it with you, and you leave us to wallow. In twenty-five years, when you have gotten your conditions a little more solidified and your universities are better organized, I predict that you will lead the world in medicine." That twenty-five years has just expired. That Professor Thiersch was a good prophet, I am not prepared to say; but I do say that we have a great duty ahead of us in living and possibly making true that prophecy.

I do not think any of us who are students can be influenced unless we say we have missed during the years of the war many of the German contributions to medicine, and the conundrum to me is whether we will be able to take advantage of the opportunity now accruing to us to assume the premiership in medicine. We all know that as technicians and operators we are probably the best in the world, but I do not think up to this time that we, as a nation, have attained the depth of thought and the desire for knowledge for knowledge's sake that characterized our Teutonic confrères, and I think that is a thing we want to face in the future. We want to extend our university atmosphere; we want to instil into the minds of our young men that mere operative skill is not the main thing, but that the real thing is the love of knowledge, and a love of knowledge is a very remunerative occupation. Until we can do that, I do not think we are prepared to consider that we lead the world in medicine. I do feel, however, we have great hopes in this country. I think the war has shown we have an amount of idealism which is unrealized, and long before the war our young men were idealists in many respects and can be trained to face the problems of medicine in an idealistic spirit. Those of us who are older men cannot hope to do much except to carry on present traditions, but we can make it easier for the young men to face these problems in medicine in which we can attain prominence.

I did not mean to preach this sermon, but it occurred to me in connection with the men abroad, and now, again, I extend to you a hearty welcome to Baltimore and hope your stay here will be most enjoyable.

At this juncture the President, Dr. I. S. Stone, Washington, D. C., took the chair and said: Fellows of the Southern Surgical Association: We have come together in annual session after twelve months of united national determination to suppress a selfish purpose on the part of a powerful and autocratic nation to force its rule upon other nations. It was expected that we should have a reduced number in attendance at this session, although that remains to be seen. The epidemic of influenza came upon us at a critical time, and we feared that that might interfere with the preparation of papers for the program. But neither the epidemic nor the war has diminished the ardor or the ambition of our secre-

tary, who never faltered in his determination to hold the Association in an unbroken record of annual sessions. And now, before declaring the Association ready for the transaction of business, pardon me for felicitating myself on this occasion which brings this greatest distinction of my life, in my native State and in the home of my alma mater.

Messages and letters of regret were received from the following Fellows who were unable to attend the meeting: Dr. William M. Mastin, Mobile, Alabama; Dr. William D. Haggard, Nashville, Tennessee (cablegram from Paris, France); Dr. Edward G. Jones, Atlanta, Georgia; Dr. Bacon Saunders, Fort Worth, Texas; Dr. J. A. Crisler, Memphis, Tennessee; Dr. John B. Deaver, Philadelphia; Dr. R. S. Hill, Montgomery, Alabama; Dr. J. E. Stokes, Salisbury, North Carolina; Dr. Rudolph Matas, New Orleans, Louisiana; Dr. L. Landry, New Orleans, Louisiana.

On motion of the secretary, which was duly seconded and carried, the following visiting physicians were extended the privileges of the floor and invited to participate in the discussions: Dr. H. O. Marcy, Jr., Boston; Dr. J. C. Hemmeter, Baltimore; Dr. H. A. Fuller, Washington, D. C.; Dr. J. J. Coolidge, Baltimore; Dr. A. E. Baker, Charleston, South Carolina; Dr. J. W. Moseley, Baltimore; Dr. A. W. Knox, Raleigh, North Carolina; Dr. R. L. Dickinson, Brooklyn, New York; Dr. De Witt Casler, Baltimore; Dr. James M. H. Rowland, Baltimore; Dr. Emil Novak, Baltimore; Dr. Frank Mann, Baltimore; Dr. John T. Geraghty, Baltimore; Dr. W. Oliver, Cincinnati; Dr. Foy Roberson, Durham, North Carolina.

Papers were then read as follows:

1. "Suture of Ruptured Kidney, with Report of a Case," by Dr. S. L. Ledbetter, Jr., Birmingham, Alabama, which was discussed by Drs. Cullen, Porter, Morris (Lewis C.), and in closing by the essayist.

2. "The Operative Treatment of Undescended Testicle with Special Reference to the End-results," by Dr. W. B. Coley, New York City.

Discussed by Drs. Bloodgood, Mixter, Horsley, Porter, Sistrunk.

3. "Prostatectomy, with its Preparatory and Postoperative Treatment," by Dr. Bransford Lewis, St. Louis, Missouri, which was discussed by Drs. Wathen, Morris (Robert T.), Reder, Thompson, Hendon, and Lewis.

4. "Irritable Bladder in Women," by Dr. Charles A. L. Reed, Cincinnati, Ohio, which was discussed by Drs. Hunner and Lewis, after which the discussion was closed by the author of the paper.

NOTE.—No afternoon session was held. Members of the Association visited the United States Army General Hospital No. 2, Fort McHenry, at the invitation of Colonel H. S. Purnell, M. C., U. S. Army, commanding, where clinics and demonstrations of interesting cases were given, after which the Association partook of a buffet supper given by Colonel Purnell and his staff.

Evening Session. The Association reassembled at 7.30 P.M., and was called to order by the President.

5. "A Surgical Gauze Sponge Spontaneously Expelled from the Urinary Bladder," by Dr. G. Paul La Roque, Richmond, Virginia, which was discussed by Drs. Cullen, Carr and Marcy.

6. "Stone in the Common Duct; An Analysis of Fifty Cases," by Dr. A. Murat Willis, Richmond, Virginia.

7. "Malignant Papilloma of the Gall-bladder," by Dr. T. P. Waring, Savannah, Georgia.

These two papers were discussed together by Drs. MacCarty (by invitation), Marcy, Jonas, and discussions closed by Dr. Waring.

8. "Congenital Diverticula, with Partial Review of the Literature, and Report of a Case," by Dr. William T. Black, Memphis, Tennessee.

9. "Resection of the Cecum and Ascending Colon," by Dr. J. Shelton Horsley, Richmond, Virginia.

10. "Practical Considerations with Regard to Permanent Colostomies," by Dr. William E. Sistrunk, Rochester, Minnesota.

These three papers were discussed generally by Drs. Bloodgood, Reder, Mixter, Reed, Sistrunk, Rosser, Coley, Carr, Seelig, Moore, and discussion closed by Dr. Horsley.

11. "Notes of Two Signs in Chronic Appendicitis," by Dr. Robert T. Morris, New York City, which was discussed by Drs. Rosser and Carr, after which the discussion was closed by the essayist.

On motion the Association adjourned until Wednesday, 9 A.M.

SECOND DAY.—*Wednesday, December* 18, 1918

Morning Session. The Association met at 9 A.M. and was called to order by the President.

12. "A Summary of the Surgical Treatment of Goitre, Illustrated with Lantern Slides," by Dr. Miles F. Porter, Fort Wayne, Indiana, which was discussed by Drs. Wathen, Rosser, Mixter, Sistrunk, Jonas, Marcy, and discussion closed by the essayist.

13. "Pathological Studies in Recent Pneumonia Epidemics," by Dr. William G. MacCallum, Baltimore, Maryland (by invitation), which was discussed by Drs. Mixter, Oliver, Bloodgood, Seelig, Downes, Carothers, and discussion closed by the essayist.

14. "Treatment of Tumors of the Upper Jaw with the Cautery, with Lantern Slides," by Dr. Joseph C. Bloodgood, Baltimore, Maryland.

Discussed by Drs. Thompson and Coley.

15. "Traumatic Chondroma of the Ribs," by Dr. John C. A. Gerster, New York City.

The President announced as the Auditing Committee Dr. Lewis C. Morris and Dr. Charles R. Robins, and as members of the Council *pro tem.* Dr. J. Wesley Bovée, Dr. Lewis C. Bosher, Dr. Howard A. Kelly, and Dr. John T. Moore.

At the close of the morning session the members and guests partook of luncheon at Dr. Howard A. Kelly's private sanatorium, 1418 Eutaw Place.

After luncheon Dr. Kelly (in conjunction with Dr. Burnam) gave a demonstration of radium and exhibited a number of patients who had been treated with radium with gratifying results.

16. Following this Dr. Curtis F. Burnam presented a paper on "The Treatment of Hodgkin's Disease by Radium."

Afternoon Session. The Association reassembled at 2.30 P.M., and was called to order by the President.

Colonel W. O. Owen, M. C., U. S. Army, showed motion pictures illustrating operative surgery, and exhibited a number of soldiers upon whom amputations of arms and legs had been performed. These soldiers walked up and down the hall with their artificial limbs in such an easy way as to win the plaudits of the audience.

17. "Notes on the Treatment of War Wounds in the Hospitals of the American Expeditionary Forces," illustrated by slides, by Dr. Charles H. Peck, New York City.

18. "Remarks on Histopathology and Treatment of War Wounds," by Colonel Bailey K. Ashford, M. C., U. S. Army.

Dr. Albert H. Freiberg, Cincinnati, Ohio, presented Major Kendall Emerson, who spoke briefly on the Prosthetic Methods Employed at the Walter Reed General Hospital in Washington, in the management of amputations of the upper and lower extremities.

Major Emerson exhibited a number of types of artificial legs and arms such as they have used with excellent results. These provisional limbs resembled closely natural limbs.

19. "When Does a Fracture Become Operative?" by Dr. Robert Carothers, Cincinnati, Ohio.

20. "Mustard Gas Burns," by Dr. William P. Carr, Washington, D. C.

21. "Some Notes from the Examination of 5000 Selected Service Registrants," by Dr. Alexius McGlannan, Baltimore, Maryland.

These papers were discussed by Drs. Marcy, Hendon, Bloodgood, and in closing by the authors of the papers.

22. "The Early History of Anesthetics," by Dr. Henry O. Marcy, Boston, Massachusetts.

On motion, the Association adjourned until 7.30 P.M.

Evening Session. At this session the Association held its annual dinner.

23. The President, Dr. I. S. Stone, Washington, D. C., delivered his address. He selected for his subject "The Standardization of Rural Hospitals."

Mr. John G. Bowman, Chicago, Director of the American College of Surgeons, followed with remarks on "The Idea Which Makes a Hospital."

Colonel William H. Welch, M. C., U. S. Army (by invitation), spoke on "Medical Developments During the War."

Adjourned.

THIRD DAY.—*Thursday, December* 19, 1918

Morning Session. The Association met at 10 A.M. and was called to order by the President.

24. "A Hand Demonstration of the Mechanism of Labor

and Types of Pelves, with Moving Pictures," by Dr. John F. Moran, Washington, D. C.

Discussed by Drs. Kelly, Williams, and in closing by the essayist.

25. "Final Results in 100 Cases of Prolapsus Uteri," illustrated by lantern slides, by Dr. John G. Clark, Philadelphia, which was discussed by Drs. Bovée, Robins, Bonifield, Kelly, Porter, Jonas, Moore, Stone, and Clark.

26. "Reconstruction of the Uterus," by Dr. Charles R. Robins, Richmond, Virginia, which was discussed by Dr. Bonifield.

27. "Gynecological Pelvic Drainage; Its Indications, Methods and Materials," by Dr. J. Wesley Bovée, Washington, D. C.

This paper was discussed by Drs. Horsley, Stone, and in closing by the essayist.

28. "Visceroptosis," by Dr. Charles L. Bonifield, Cincinnati, Ohio, which was discussed by Drs. Reed, Carothers, and in closing by Dr. Bonifield.

THE SECRETARY: Before reading the report of the Council, I wish to call the attention of the Fellows of the Association to two or three messages I have received: one from Mrs. W. D. Haggard, the wife of our former Secretary, which reads: "Greetings and best wishes for a successful meeting. I am sure Dr. Haggard is with you in spirit. This is the first meeting he has missed in twenty years." The other message is from Dr. L. H. Landry, of New Orleans, calling attention to the death of Mrs. Rudolph Matas. We also have a message from Mrs. W. E. B. Davis, of Birmingham, Alabama, expressing her regret in not being able to attend the meeting.

I wish to say that this meeting has been one of the most pleasant and profitable of all we have ever held. The roll shows that there are seventy Fellows present and registered at this meeting, nine more than were present at the meeting held at St. Augustine last year. There have been between twenty-five and thirty visitors and twenty odd ladies present. Eighty-two Fellows of this Association have been commissioned in the Army and Navy up to October 21, some of whom are overseas on active duty and some on inactive duty. The Association misses all of these men, and to those far away we must content ourselves with expressing our regret at their absence.

The report of the Council is as follows:

Report of the Council

At a regular meeting of the Council, held in this hotel December 18, at 3 P.M., the following recommendations were made:

1. That the name of Dr. Arthur Dean Bevan be dropped from the roll for non-attendance.

2. That the resignations of Dr. Henry T. Byford, Chicago, and Dr. Lane Mullally, Charleston, South Carolina, be accepted.

3. That the death of our honorary Fellow, Dr. William M. Polk, New York City, and the deaths of our Fellows, Dr. William P. Mathews, Richmond, Virginia, and Dr. James E. Moore, Minneapolis, Minnesota, be properly recorded.

4. That Dr. Walter B. Platt, Baltimore, be reinstated as reparation for a clerical error.

5. That Dr. Charles M. Hazen, Richmond, Virginia, be restored for one year at his own request, with the understanding that he be given the privilege of offering a voluntary resignation.

6. The following are recommended to fill vacancies in the roster of membership: Dr. James W. Henson, Richmond, Virginia; Dr. E. L. Gilcreest, Gainesville, Texas, and Dr. Harvey B. Stone, Baltimore, Maryland.

7. That the following officers be elected for the ensuing year: President, Dr. James E. Thompson, Galveston, Texas; Vice-Presidents, Dr. Charles R. Robins, Richmond, Virginia, and Dr. George A. Hendon, Louisville, Kentucky. The Secretary and Treasurer continue in office. Dr. Isaac S. Stone was chosen as a member of the Council to succeed Dr. John Young Brown.

8. That the Association hold its next meeting in the city of New Orleans, and that Dr. C. Jeff Miller be Chairman of the Committee of Arrangements.

Respectfully submitted,

Thomas S. Cullen,
J. Wesley Bovée,
Lewis C. Bosher,
Howard A. Kelly,
John T. Moore.

THE PRESIDENT: What will you do with the report of the Council?

DR. W. P. MCADORY: I move that the recommendations of the Council be adopted.

Seconded and carried.

DR. THOMAS S. CULLEN: The success of this meeting is largely due to one man. We Baltimore men were dubious as to the advisability of holding a meeting. In the first place, on account of a large number of men being away; second, whether we could get a sufficient number of papers from men to hold a three-day meeting, and it was only through the insistence of our Secretary, Dr. Royster, that we decided to have a meeting. I know I voice the sentiments of the President, Dr. Stone and the members of the Council in expressing the thanks of the entire membership to Dr. Royster who insisted on us holding a meeting at this time.

PRESIDENT STONE: I can heartily endorse what Dr. Cullen has just said.

The Auditing Committee, through Dr. Robins, reported having examined the accounts of the Secretary and Treasurer and finding them correct.

It was moved and seconded that the report be adopted. Carried.

DR. R. L. PAYNE: We have been exceedingly well cared for in Baltimore and royally entertained, and I rise to move that we extend a vote of thanks to the local Committee of Arrangements, to the Baltimore members of the profession and to the hotel management for the many courtesies shown us during this meeting.

DR. W. P. MCADORY: I second the motion. (Carried.)

PRESIDENT STONE: I want to say a word about a gentleman who has been with us for a long time, Mr. William Whitford, of Chicago. As our official stenographer, he has attended and reported the proceedings of this Association for thirty consecutive years, a record I am proud to refer to. He is well known to the Fellows of the Association, who appreciate his efficient and faithful services.

DR. ROYSTER: I heartily agree with what Dr. Stone has said with reference to Mr. Whitford. While your Secretary writes the names of the essayists and the names of the discussors on the blackboard, our official stenographer is the man who does the real work.

Mr. Whitford thanked Dr. Stone and Dr. Royster for their kind words and for the ovation received.

PRESIDENT STONE: The hour has come when a great distinction is to be handed over to another, and I am going to ask Dr. Bovée and Dr. Winslow to escort your new President to the platform.

President Stone, in introducing his successor, said: Gentlemen, I have no speech to make on the present occasion, but I want to say that you have elected a man to the presidency of this Association whom we all know and have known for a long time. He has been selected from a number of meritorious gentlemen who are members of the Association, not because he is an old man or because he is a young man, but because he deserves the distinction and comes from the Lone Star State—a State which Andrew Carnegie said was not only greater than all of Germany, but her policy and resources would seem to be equal to or surpass those of any other State in this country. He represents a noble State, and he is a noble gentleman to represent a noble State. I take the greatest pleasure in introducing to you your President, Dr. J. E. Thompson.

DR. THOMPSON, in accepting the presidency, said: Fellows of the Southern Surgical Association, Ladies and Gentlemen: I feel deeply, more deeply than I can ever express, the great honor you have paid me in electing me to this high office. It was unexpected, and therefore all the more appreciated because unexpected. I feel that this honor is paid not alone to me but to the great State of Texas, to the medical profession of Texas, and to our University of Texas, which I think is one of the coming universities of the country. Nevertheless, one's personal vanity must be gratified a little, and I think probably my own personal vanity has been gratified to a great extent.

It has always been to me one of the greatest pleasures of my life to come to these meetings, not only to contribute but far more to learn, and if I have contributed anything of value toward the success of this Association, I am sure it has done me more good possibly than anybody else, because if there is any good obtained from a paper the writer of that paper gets 90 per cent. of it and the hearers probably 10 per cent. I have felt it my duty to attend the meetings of this Association and to profit by the papers and discussions.

I feel deeply grateful to you, and when I look over the list of my predecessors, I hope I shall be equal to the occasion. It makes one humble to think that he has to follow such great men, and I am afraid my trepidation now is nothing to what it will be next year when I read the annual address. I feel like uttering a prayer which goes something like this:

> Make me at least discreet;
> Help me to hide my self-conceit.
> Grant that my virtues may atone
> For small vices of my own.

29. "Unusual Gunshot Injury of the Musculospiral Nerve," by Dr. Francis Reder, St. Louis, Missouri.

30. "Transplantation of the Appendix into the Female Bladder to Supply an Absent Urethra," by Dr. Charles M. Rosser, Dallas, Texas, which was discussed by Drs. Stone and Hunner, after which the discussion was closed by the essayist.

As there were no other papers to be read or further business to come before the meeting, on motion the Association adjourned to meet in New Orleans, Louisiana, December 16, 1919.

HUBERT A. ROYSTER, M.D.,
Secretary.

ADDRESS OF THE PRESIDENT

THE STANDARDIZATION OF RURAL HOSPITALS

By Isaac S. Stone, M.D.
Washington, D. C.

Preliminary. These annual sessions of our Association have always been considered a time for the most friendly interchange of thought by the entire membership, and especially is this true of a society in which each member is a friend of every other. Before taking up the discussion of the main subject, I shall adopt the usual custom of commenting briefly upon a few matters, one of which pertains to a constitutional provision regarding the work of the Association.

Our Association has lost three valued Fellows who have been claimed by death. They are: Dr. William M. Polk, of New York (Honorary); Dr. J. E. Moore, of Minneapolis, Minnesota, and Dr. William P. Mathews, of Richmond, Virginia.

In the midst of active military preparation for the great world war, we have passed through nineteen months of intensive life as a nation, and only recently have returned to thoughts of peace and adjustment in normal ways. As to the work of our Association, perhaps it is fitting to say that the great majority of our members gave their first thought to the needs of their country, and especially to their fellow-

men who went to war in the name of freedom for others as they were free. If contributions to surgical literature have lessened in number it is due to their service in camp, or in the hospital or at the front, and not to any loss of interest. The recent epidemic of influenza very nearly exhausted the supply of medical men and resources and caused the postponement of the meetings of many national and State societies, our own hanging in the balance for a time.

Since the Association has conferred upon me the highest honor and distinction in its power, and has been so kind and generous as to make one of its unprofitable members, for the time being, the "Head of the Corner," various good resolutions have been considered, and possibly some have been adopted. The first thing after adjusting myself to the new and honorable position as best I could, was to read many of our former presidential addresses, with the hope that I might become inspired in some way to write an address for the present occasion. After hearing many of these addresses, and also after reading them, one becomes possessed of an intense admiration for the eloquence and resourcefulness of the authors thereof, even though one feels almost helplessly unable to find anything left unsaid which may be considered worth while. There is, however, one thought which has occurred to me, as doubtless it has occurred to others, namely: Is Article II of our Constitution best construed by omitting all discussion of the presidential admonition or all advice?

Article II says: "The object of this Association shall be to further the study and practice of surgery in its various departments, especially among the profession of the Southern States." Admitting that we who are members enjoy the annual feast of scientific papers presented on our programs, the question, however, arises: Do we serve others as well as ourselves in that we send out nothing with the endorsement of the Association; have no work as a corporate body, which, through the council or special committees or otherwise,

could reach the public or outside profession, and would stand for the furtherance of the "study and practice of surgery?" Meanwhile, another association has been organized with an ambitious pronouncement, is assuming many of the ways of a pretentious organization, which is catering to every shade of professional opinion and all apparent needs of the profession in the same territory as that occupied by our organization. We may do well to be sure that we take and hold the lead in the effort to further the study and practice of surgery. Are our readings and discussions of surgical subjects and their publication the only way to comply with Article II_2 or would additional force and impetus be given to independent or individual opinion by joint or supervisory action of the Council or even by the Association itself?[1]

Very early after our entry into the war our national medical department began to organize its forces in preparation for the care of many thousands of injured and disfigured men who would require reconstructive surgery. Aside and apart from saving life, there can be nothing finer and nobler than to make that life useful, and the form which sustains it comely and beautiful. I am assured that our Fellows will have a full share in this important service.

Our sessions coming so soon after the signing of the armistice and before the sessions of the peace conference, should prove to be a time for congratulations and profitable discussion of the lessons learned by those having experience in the many and varied results of disease and injury to men in camp and at the front.

Our Fellows who are engaged in the service of their country with the Army, Navy, Public Health Service, Red Cross or other organizations will continue their work indefinitely, or until our boys are back home from "over there," when all can join in the story of following the flag to victory which should uplift every patriotic soul.

[1] This would be especially appropriate in case symposia should be introduced into the program.

Standardization of Rural Hospitals. The advances in medical education have developed a demand for more and better hospitals where students and physicians can have suitable opportunities for clinical instruction. The hospital must be properly equipped or it cannot be expected to fill the requirements of modern teaching, hence, as a result of this innovation, practically all hospitals connected with medical schools are classified according to their compliance with certain regulations framed by the Council of Education of the American Medical Association. But all hospitals are not connected with medical schools, and all surgeons may not directly favor reforms in their capacity as members of hospital staffs, therefore it seems imperatively necessary to influence both the surgeon and the hospital by developing an organization whose chief duty is to cultivate and elevate the standard of all surgeons, and to standardize the institutions to which they are attached.[1]

The American Medical Association, the American College of Surgeons and the Carnegie Foundation have each done valuable work in this line and are chiefly responsible for recent reforms in hospital management.

Having had some knowledge of private and other small hospitals, and recognizing the insufficiency of hospital accommodation in small towns and rural districts, I have concluded that other methods than those formerly in practice might result in a greater extension of hospital relief, and would also standardize the small hospitals and elevate them from the region of doubt and suspicion to a dignified and honorable position in which a town or community could take reasonable pride.

During the last twenty-five years there has been a remarkable increase in the number of patients admitted into hospitals everywhere. Formerly, they were intended chiefly for the poor, and comparatively few pay patients were received;

[1] The American College of Surgeons has undertaken this task.

or, it should be said, applied for admission. Everyone knows that great changes have occurred and why all classes of our population seek the hospital when ill. The skepticism and suspicion of hospitals in former days has largely disappeared, having been banished by thorough systematic administration, by taking the public into consideration and by the development of a sentiment favorable to institutional work. Probably nothing has succeeded so well in convincing the public of the benefit to the community of properly organized hospitals, as the determination by hospital staffs and boards of direction to adopt higher standards of efficiency. And this efficiency generally comes as a result of pressure and insistence by the staff upon the hospital management, although the staff itself must first undergo a regeneration.

The demand for rural hospitals is not as great as is desirable, as shown by a recent inventory.[1] Our rural taxpayers are willing as yet to support institutions for the treatment of the insane, but they look askance at propositions to provide for better treatment of patients with other ailments than diseases of the mind. However, there is hope ahead, for large numbers of these excellent people fly to city hospitals when ill, where they pay for private rooms and attendance and incidentally learn the value of good hospital care. It is, however, not altogether a settled question whether or not a state, county or town should salve its conscience and avoid responsibility for the care of its sick by sending them, or permitting them, to seek treatment away from their own community, very often asking for the charity supported by the taxpayers of another State. But an increasing number of hospitals are being established in our towns and in rural districts, which movement demands regulation and supervision if such hospitals prove equal to standards now being set by enlightened sentiment in the profession and among the public. Time will not permit an extended discussion of

[1] Made by the American College of Surgeons.

the loose methods practiced in many public and private hospitals when these institutions are responsible only to a close corporation, whether this corporation is composed of one individual, or a board of a dozen members. It is highly probable that many States are like one of our nearby commonwealths in once having a vast majority of rural hospitals without many of the actual essentials of modern management and methods, which render it impossible to obtain uniformly good results of treatment, not to mention the deception and imposition practiced upon unsuspecting patients. In a large majority, perhaps 75 per cent. of these hospitals (outside of large cities) neither pathologist nor laboratory, anesthetist nor roentgenologist was connected with the staff of the institution. Inspection and publicity have accomplished marvellous results in the State above alluded to, and through the efforts of the Bureau of Medical Education and Licensure, these specialists are required by law. In other words, an educated public sentiment has been created which upholds the law and compels its enforcement. All hospitals should be officially inspected at least once each year, and be obliged to send a report of the entire work of the institution to the health office of the State whether the hospital receives State aid or not. The officer in his official capacity should recommend to the attorney-general of the State (or the official whose duty it is to supervise the licensure of institutions), to issue a license or not as he thinks proper.

In consideration of standards which must be set up for the guidance of the promotors of hospital extension, it would seem imperative that each State should have an independent hospital board whose duties should be supervisory in character, but acting under the lead of the national organizations which have made a study of hospital conditions and necessities for the entire country.

The writer advocates the establishment of a system of general public or rural State hospitals chiefly for the treatment of ordinary medical and surgical patients, in convenient and

suitable localities for the treatment of the rural sick of remote districts.

1. Every small or rural hospital should have the same standards as the model hospitals of the large cities.

2. There should be a local board of directors composed of independent and competent persons (not all necessarily men) who should decide upon and provide the financial support of the institution, appoint the resident officers, supervise the administration, authorize an annual report showing all of the work of the hospital, and see that copies of it are sent to every physician in the town, county or allotted territory supporting the hospital. They must secure a license or permit from the health commissioner or officer of the State, who in return must inspect the hospital annually, and report its condition and the work done therein to the governor or attorney-general.

3. The essential staff should be a superintendent and head nurse with pupil nurses, and at least one interne who should be competent for ordinary laboratory work. An anesthetist a roentgenologist, a pathologist and bacteriologist should be connected with the hospital, and are to be residents thereof if the number of patients warrants the outlay. Otherwise they must visit the hospital as required.

Each hospital should furnish and keep a record of the medical and surgical history of every patient, giving the diagnosis before and after operation, with result of operation, and pathological findings. The visiting staff and essential staff named above (pathologist, anesthetist, etc.), if living outside the hospital, must keep a record of all work in the interest of the hospital and include the number of days on which visits were made, in an annual report to the board of directors. In this way only can it be seen just how much service each officer has performed and how much interest has been shown in the success of the institution.

It is imperative that the laboratory work of all hospitals be featured, for this is the acid-test of efficiency. Experience

abundantly shows that a majority of small hospitals have ignored pathological and laboratory work, even after a labortory has been provided. When once this backward step has been taken, case histories drop off, then comes the "furor operativus," or else operations done without preliminary study and diagnosis, which is demoralizing and conducive to other irregular practices.

It is a common, almost a universal practice, to ignore the pathological department of hospitals unless the hospital is connected with a medical school, in which case the requirements for graduation serve to maintain discipline in this direction, for it is not alone that the teachers demand a certain compliance with regulations, but the students themselves are ambitious to acquire information and skill in pathological work. When a young pathologist attains an appointment in a hospital, he seeks the support of the staff, but often fails to get it, with the result that his work is neglected and he finally becomes interested elsewhere than in the laboratory. Here the staff is plainly and positively responsible for the failure to sustain interest in the laboratory, and it will not suffice that another pathologist be appointed, for the staff must perform its duty by showing interest in the work of the laboratory and by having the pathologist present at staff meetings to make his report, and to participate in the discussions which should follow.

The administration and maintenance of these hospitals should be absolutely independent and entirely different from that of all appearance of the private hospital as usually conducted, and every precaution should be taken to prevent personal assumption of influence. Unlike the private hospital the object should be to have many persons interested in its support. The granting of special privilege which has been sought by an individual will generally result in driving away greatly needed moral, financial and professional support.

Appointments should be made by the directors, and appointees should not be known as under obligation to Mr.

or Dr. So and So. The hospital should be thoroughly democratic and conducted for all of the people who are taxed for its support, and at the same time should be administered with justice and fair dealing toward everyone within or connected with the institution.

After the hospital has been decided upon, the selection of a staff may be undertaken and a competitive examination held for an attending physician and an attending surgeon. This examination should be held by a non-partisan committee, and local county physicians should be requested to take the examination. In case no one is found competent to fill the position named, arrangements should be made with outside parties with a view to obtaining the most suitable and properly qualified men. Why should not this be an incentive among county physicians to become proficient in their qualifications? And why should not such hospital experience qualify men for other and perhaps wider fields?

The demand for rural hospitals will ultimately become aggressive in the opinion of the writer, at least as soon as the rural public learns that it is entitled to this service. The Secretary of Agriculture recently said that many innovations would be forthcoming in the near future, involving national aid which are intended to contribute to the interest in country life and for the comfort and convenience of rural communities. Prominent among these were rural sanitation, good roads, and last but not least, rural hospitals. The Secretary informed me that he had not been requested to advocate the hospital idea, but realized that our rural population is denied what is their right to possess. Movements are developing in certain parts of the country which show the tendency in this direction, notably in Iowa, Missouri, Pennsylvania and in Canada. It is not too much to hope for that these hospitals may fill even more than the ordinary requirements of medical and surgical patients. They may become the social service center for the country, have a "follow-up system," and nurses

may be trained and sent out on demand to distant homes where needed.

When all of the States fully realize that inadequate care is given many poor women expecting the advent of children, and that many mothers and children are annually sacrificed, they will begin to look after their vital statistics and to provide favorable conditions under which childbirth should be attended under circumstances favorable to the salvation of human life. We have seen how a democracy can assume the functions of an autocracy, as recently seen in this country during the war, but the writer has decided in his own mind that if autocratic methods are necessary to show our citizens what is their duty and in their own interest concerning matters of health, the sooner such an autocracy is established the better.

The time has come when it must be considered the duty of each expectant mother to place herself under the care of a physician competent to decide the question of her capacity for motherhood, and the husband should be held morally, if not legally, responsible for her care. If the family physician cannot decide such questions he should see that the patient obtains proper advice. My own opinion is that the rural hospital is, or should be made, a suitable place for the preliminary examination of all pregnant women within an allotted territory, who are unable to pay for competent advice, and that no woman, especially no primipara, should be allowed to come to full term without having had an inventory made of her chances for safe delivery. Furthermore, if such women are beyond the reach of competent medical attendance, they should be instructed to apply for hospital care and attendance.

I do not intend in this brief outline to ignore or underestimate the work of many private hospitals in all of our States, nor that of many charitable institutions conducted by various religious or beneficial organizations. But it is best to provide inspection for all, for instance by the health

officer of the State, or his deputy, in order to raise the general standard of management and treatment with the view of better work by hospital staffs and better service to the public. Such inspection, publicity, and licensure will not be opposed by any hospital with nothing to conceal and cannot safely be refused by any others. Besides this, it is almost a certainty that hospitals generally would be benefited and strengthened by the methods proposed. In fact, many struggling institutions should look well to their interest in the future, for the growing demand for greater and more extended medical care of the rural sick is the opportunity for these places to accept State or other aid by passing under the beneficent control of the new order, which will eventually become the rule.

SUMMARY. In conclusion and to summarize it is suggested:

1. That all hospitals be inspected by a competent nonpartisan State board with a view of their standardization. This inspection should be extended to all classes of institutions in which ordinary medical and surgical patients are treated, whether large or small, private or public.

2. That standardization of hospitals means the same essential equipment for all hospitals, the minimum requirement that all shall provide suitable scientific care of all patients admitted into the institution.

3. That suitable provision for hospital care of the rural sick in remote districts should be made the business of the State acting through the hospital board above mentioned.

4. The board of directors of each State hospital should take charge of all financial matters concerning the institution, besides having sole charge of all appointments.

5. The administration should be absolutely independent of the medical staff.

6. The staff should be chosen according to the methods usually adopted in model institutions, but the medical and surgical chiefs should be appointed after a competitive examination, and none should be admitted to the competition

without having the credentials provided by a State examining board. After the selection of the two chief members of the staff, they should have a voice in the appointment of all associates, assisting in their selection but not voting for their appointment.

7. A complete system of all records should be kept; a follow-up system established and monthly and annual reports made, similar to those in model hospitals. All members of the staff whether visiting or resident should keep records and make either monthly or annual reports to the board of directors showing the work done and including the number of days on which visits were made.

8. The hospital should be made a medical and social service center for the county or district in which it is situated, and its laboratory should be equipped for all professional or expert examinations needed in that territory.

Finally, it is possible that the hospital may be made useful in breaking down prejudice among physicians, and in promoting a better professional spirit of a coöperative character rather than the rivalry often observed.

SUTURE OF RUPTURED KIDNEY WITH REPORT OF A CASE

By S. L. Ledbetter, Jr., M.D.
Birmingham, Ala.

At the last meeting of this Association, J. M. Mason[1] reviewed the subject of subparietal injuries of the kidney, recommending early exploration as the proper and logical method of procedure. This excellent review was freely discussed and it was the general opinion that early exploration should be resorted to in all cases, with the possible exception of that group of cases according to Neilson[2] "in which the local symptoms are insignificant, constitutional symptoms are absent and slight hematuria alone directs attention to the probability of kidney injury."

Operative Measures. All operations upon injured kidneys are exploratory, as it is impossible without inspection to know the character and extent of the injury. The methods of procedure may be summarized as follows:

1. Nephrectomy. 2. Packing and drainage. 3. Suture. 4. Splitting the capsule in certain cases of edema and congestion without rupture.

1. *Nephrectomy.* Nephrectomy is indicated when the lacerations are so extensive that the kidney is hopelessly damaged and in neglected cases with beginning sepsis.

2. *Packing and Drainage.* I consider this a dangerous procedure to follow. There is always danger of secondary hemorrhage, the convalescence is prolonged and some infec-

tion is sure to occur that later may give rise to a pus kidney or stone formation, as is occasionally seen after injured kidneys have been treated expectantly.

3. *Suture.* This seems to me to be the ideal method to follow in those cases operated upon early with clean-cut lacerations and intact blood supply. Of course this method cannot be advised in cases where there has been a delay in exploration. Watson[3] has collected 10 cases of suture without fatality; Connell[4] reports 3 personal cases of successful suture and has collected 16 cases with 2 failures, 1 being followed by a urinary fistula and the other requiring secondary nephrectomy; Royster reports 1 case that died nine days after operation with pneumonia. These statistics, though small in number, compare favorably with the results from nephrectomy; and I am sure, had these cases been treated by gauze packing, that the results would not have been quite so good. Watson reports a mortality of 22.5 per cent. after nephrectomy and 8.5 per cent. in 107 cases of gauze packing.

Case Report. Only one case of suture of ruptured kidney has come under my observation. This patient was a negro male, aged twenty-four years, who, on January 2, 1917, fell from a scaffolding striking his right flank across a piece of iron casting. I saw him a few minutes later and he was suffering greatly and moderately shocked. He was sent to the hospital and examination revealed the following: Pain and tenderness on palpation over the right kidney, pulse 110, respiration 25, and temperature 99°. The bladder was catheterized and a large amount of bloody urine removed. This was at 9 P.M., and the white blood count was 20,000, this leukocytosis being due to the hermorrhage. Two hours later the count was 20,400, showing that there was no increased bleeding of any moment; and, as his general condition was good, he was put to bed and made comfortable with morphin. The following morning the bladder contained a large amount of urine with a fairly large amount of blood.

The leukocyte count was 19,000; and, cystoscopy showing the blood to be from the right kidney with clear urine from the left, it was then decided to explore the right kidney.

The kidney was easily delivered and a transverse laceration was found at the junction of the middle and lower thirds, going down to within 1 cm. of the pelvis on both anterior and posterior surfaces and on the inside down into the pelvis. Though quite an extensive rupture, the blood supply was intact, the wound surfaces smooth and regular, and there was not a great amount of blood about the kidney.

Dr. J. M. Mason was present and advised suture and I followed his advice, knowing that he had made a special study of these injuries. The laceration was sutured with interrupted mattress stitches using 000 ten-day chromic catgut placed rather far apart and tied rather loosely. A few single stitches were placed between the mattress sutures to hold in place the fatty capsule which was drawn down closely over the line of suture. A small cigarette drain was inserted and the wound closed. The patient made an uneventful recovery and left the hospital on January 22.

The first two days after operation the maximum temperature was 101°. On January 4 the day after the operation there was very little macroscopic blood in the urine, but microscopically there were many blood cells and a number of casts; and the white blood count was 20,000. The next day it was 19,000 and the following day 13,000. On the sixth day after operation it was 8000.

When the patient was discharged from the hospital nineteen days after operation the urine contained only an occasional red corpuscle and very few leukocytes. After leaving the hospital this patient quickly regained his strength and the urine was repeatedly normal. Early in June I wrote him requesting that he come in for a kidney function estimation, but learned that he had been inducted into army service.

References

1. Mason, J. M.: Tr. Southern Surg. Assn., 1917, xxx, 183.
2. Neilson, Thomas R.: Am. Jour. Med. Sc., January, 1908, cxxxv, 54.
3. Watson, Francis E.: Boston Med. and Surg. Jour., 1903, cxlix, 29.
4. Connell, F. G.: Surg., Gynec. and Obst., June, 1916, xxii.

DISCUSSION

Dr. Thomas S. Cullen, Baltimore, Md.—I am glad Dr. Ledbetter has drawn our attention to the suturing of the kidney instead of just packing it. I have sutured the kidney in many cases after removal of stones from the pelvis or from the calyces. In one case when the patient had hematuria from one kidney I found on examining the kidney many miliary abscesses both on the surface and in the substance of the organ. Many of these were opened with the point of a knife. The opened kidney was then brought together with mattress sutures of catgut threaded on liver needles. The kidney was then surrounded with gauze drains. The patient made a very satisfactory recovery. The same procedure can be applied to the treatment of pathological conditions of the liver. Instead of packing one can suture the liver with as much ease as he can suture the uterus, provided he uses liver needles that will not cut through the substance of the liver. The use of blunt needles is the key to success in the suturing of the kidney and also of the liver.

Dr. Miles F. Porter, Fort Wayne, Indiana.—I would like to report in connection with this paper a very interesting case, and to call attention to the fact that we may have an extensive laceration of the kidney as a result of a comparatively slight abdominal injury. The patient was a young man, aged eighteen years, who was brought to the hospital with a history of having received a blow from a fall on the abdomen from the handle of a bicycle. He was suffering from the ordinary symptoms of intra-abdominal hemorrhage, and I was surprised to find, on opening the abdomen, that the hemorrhage resulted from a ruptured congenital cystic kidney of that side. I thought the case would

be interesting to report in this connection with the case of rupture of the kidney occurring from a rather unusual source. The kidney was removed, and, like Dr. Ledbetter's case, the young man is now in the service of Uncle Sam. This was about twelve years ago.

Dr. Lewis C. Morris, Birmingham, Alabama.—I do not want to disagree with the surgical principles laid down by Dr. Ledbetter, regarding early exploration in injury to the kidney, in which the symptoms of hemorrhage and shock indicate injury of moderate severity. There are, however, exceptional cases in which expectant treatment gives satisfactory results. I had a case recently—a little boy, aged six years, who had been run over by a wagon. He lived some distance from Birmingham, and did not get into the hospital for twenty-four hours after injury. His urine had been bloody since a few hours after injury, and at the time of the examination the abdomen was rigid and the temperature 102°. No exploration of the kidney was undertaken, but the expectant plan adopted until the possibility of injury to the hollow viscera could be excluded. The boy improved, the bowels acted, the kidney hemorrhage decreased and disappeared entirely after a week.

The bleeding began again on the eighteenth day after the injury, and was so excessive as to seriously threaten life. The pulse became rapid and weak, and the child was profoundly exsanguinated. He was brought back to the hospital (he had been permitted to go out) and the kidney explored on the nineteenth day after injury. The kidney was extensively mutilated and a large amount of blood-clot partially organized was cleared out of the capsule and the kidney packed. The removal of the kidney could not be considered on account of the child's condition. He made an uncomplicated recovery, and, while no cystoscopic examination has been made, I feel sure that the remains of the kidney tissue is functionating.

Had that kidney been explored immediately after the injury, I feel that on account of the extensive mutilation it would have been deemed best to have done a nephrectomy. I believe that the injured kidney will continue to functionate, and the child will be better off with a crippled kidney than he would have been had a nephrectomy been done, as was almost inevitable in the beginning.

Dr. Ledbetter (closing).—I am glad Dr. Cullen spoke of suturing the liver. I recently had the opportunity to see a gunshot wound of the liver with quite an extensive rupture which was sutured very successfully. In Dr. Morris' case, as he says, possibly if he had operated on this case early he might have removed the kidney. However, I believe that the kidney immediately after the injury would not have looked as badly as it did later on; and that it might have been in such shape that he possibly could have sutured it.

ECTOPIC OR PELVIC KIDNEY

By E. S. Judd, M.D.
and
S. W. Harrington, M.D.
Rochester, Minn.

Renal ectopia, or congenital misplacement of the kidney, is a condition in which the kidney has never occupied its normal position and is to be distinguished from the movable kidney in which case the kidney has wandered from its normal position. Renal ectopia is due to developmental defects of the renal anlage. The renal buds appear on the dorsal aspect of the Wolffian duct, shortly after it has reached the cloaca, as a thickening and bulging of the wall which soon develops into a narrow stalk capped with a mass of mesoblastic tissue, designed to be the future kidney. These buds grow dorsally during their process of development, ascend from in front of the second sacral vertebra rotating to a lateral position on either side of the vertebral column, and reach their normal position in the lumbar region about the end of the second month. It is not until after they have reached this position that they receive vascularization. This process of ascent and rotation may stop at any point during its course, or it may not be instituted at all; thus the kidney never reaches its normal height, and becomes permanently fixed in an abnormal location. Variation in size and form often follow from its adaptation to its surroundings, being governed to some extent by environment and develop-

mental defects. Often there is an associated defective development of Mueller's duct, which does not normally develop until after the primitive kidney has reached its final height, which accounts for the frequent association of genital malformations with ectopic kidney.

Renal malposition is comparatively rare but occurs often enough to interest diagnosticians, and a sufficient number of such cases develop pathologic conditions requiring surgical intervention, to interest the surgeon. The condition has been recognized for centuries, and was well known to the early writers of the sixteenth century, but it was only of anatomic interest. The frequency of the occurrence of misplaced kidney has been variously stated by different authorities: Maumann in 1897, reported 21 cases in 10,177 necropsies at the Kiel pathologic institute. Gerard, in 1903, estimated its occurrence as 1 in 2500. Guizzetti and Pariset, in 1910, reported 18 cases in 20,000 necropsies. Within the last two decades the condition has become of surgical interest, and with the most accurate means of diagnosis now used is steadily growing in importance clinically. Dorland, in 1911, reviewed the literature and found 121 clinical cases reported. He stated that about 100 of these had been published since 1898 and that in less than one-third of them the symptoms were due to displacement or disease in the ectopic kidney. Plummer, in 1913, reported 67 cases, collected by Strater in 1906, to which he added 17, making a total of 84 clinical cases. Operations were done in 63 of Strater's 67 cases; 48 were some type of operation on the kidney.

Our series comprises 20 cases of ectopic kidney which have been selected from the records of the clinic. In 9 of these, operations were done because of pathologic conditions in the misplaced kidney. In the remaining 11 cases the condition was discovered either during the course of some other operation, or in making a routine kidney examination. In these 11 cases the kidney, while misplaced, was not producing any symptoms and apparently was functioning normally.

Anatomic Features. The ectopic kidney shows some distinct anatomic features, mostly in its blood supply. It is usually approximately normal in size and shape when not diseased, although it may be smaller than normal. It may be oval or pyramidal in contour, depending somewhat on the surrounding structures, and at times it may retain its fetal lobulations. The origin of the bloodvessels supplying the misplaced kidney is always lower than normal. The arterial supply is very liberal; as many as six vessels entering the kidney have been reported. These vessels may come from the lower few inches of the aorta, from a branch of the aorta, or from both. The usual origin is the lower few inches of the aorta, especially at the bifurcation, or they may arise from the midsacral or inferior mesenteric. As a rule the veins correspond to the arterial supply, but an anomalous arrangement is frequently met with. The ureter is generally shorter than normal. It takes the shortest course in a straight line to the bladder, and enters it in the normal position. The pelvis of the kidney and the ureter are usually anterior on the kidney, and in this manner they retain their fetal relation. At times the pelvis is not fully developed. The position that such a kidney assumes varies greatly, depending, to a large extent, on the time at which the normal process of development ceases. Its most frequent location is entirely within the small pelvis behind the uterus, to one side and resting on the promontory of the sacrum or sacroiliac joint. At times it is located in the iliac fossa, and rarely in the abdominal wall. It is usually firmly fixed in the position assumed due chiefly to its vascular pedicle. It may become movable from trauma or pregnancy. The pelvic kidney is much more frequently found on the left side than on the right, and it is usually on the side where it normally belongs, although crossed ectopic kidneys are quite often seen. Occasionally both kidneys are in the pelvis, and rarely an ectopic supernumerary kidney may be found. The adrenal glands develop independently; they are always found in their normal position and never

accompany the ectopic kidney. It is interesting to note the frequency with which genital malformations of both sexes are associated with dystopia of the kidney, and this is particularly true in cases of single pelvic kidney. The genital defect, if unilateral, is found on the same side as the ectopic kidney. The more frequent defects are the imperfect development of the uterus and the vagina, or the uterus and the vagina may be entirely absent. There may be an absence of vulvar and urethral openings, and atrophic and undescended testicle is frequently seen. In quite a number of the reported cases there has also been an imperfect development of the urinary bladder. Definite mental disturbances have been observed associated with ectopic kidney, and are believed to be stigmata of degeneration due to developmental defects. The ectopic kidney is usually normal and although these kidneys are subject to all the pathologic conditions to which a normal kidney is subject, they are only discovered by chance during an examination, or at necropsy. When any lesion exists in the kidney, there seems to be a tendency for it to become hydronephrotic, probably because of the short ureter and poorly formed pelvis and ureter. The surrounding structures may also play a part in this condition. Stones are frequently found in these kidneys, as is also cystic degeneration and tuberculosis.

Clinical Features. From clinical observations it appears that these cases occur more often in females than in males, but at necropsy, it is found equally in both sexes. This is undoubtedly owing to the fact that the misplaced kidney is more prone to cause symptoms in the female which simulate disease of the uterus and adnexa, and also menstrual disturbances. When the ectopic kidney is pathologic the symptoms are the same as when the condition is present in a normally placed kidney. The diagnosis depends on the physical findings, the *x*-ray and the kidney examinations. The diagnosis, ordinarily, is not easily made, but there are some physical findings which will be of aid. The palpation

of a tumor through the abdominal wall or rectum especially with the absence of the kidney from its normal position, is suggestive of the condition. The absolute and relative fixation of the tumor and often the palpation of the lobulations of a kidney, the depression in the hilus, and at times the pulsation of a large artery on its anterior wall, may be noted. The presence of genital malformation associated with a pelvic tumor should lead one to suspect ectopic kidney. Cystoscopic examination and pyelography give the most accurate data, and it is on these data that a definite diagnosis is made. Frequently the cystoscope reveals certain fairly characteristic features, especially the pulsation in the trigone from an underlying large renal artery. The ureteral meati are usually normal but the ureter from the ectopic kidney is much shorter and at times is coiled and distorted. The pyelogram shows the abnormal position of the pelvis and makes it possible to determine whether or not the kidney is pathologic. The presence of stones also is shown.

The differential diagnosis is more difficult in the female than in the male because of the frequency with which the ectopic kidney causes symptoms referable to the adnexa. In many instances a pelvic kidney has been called an ovarian cyst and explorations have been made with the idea that the condition was a cyst in one of the ovaries. A pyonephrosis in an ectopic kidney has been mistaken for pyosalpinx. The most common error in diagnosis in the male has been in differentiating between it and inflammation in the appendix. In 2 of our cases it was quite difficult to determine whether the symptoms were being produced by the appendix which showed a slight degree of inflammation or whether they were produced by some infection in the pelvic kidney.

Treatment. From a surgical point of view the treatment of ectopic kidney differs in no essential from the treatment when the organ is in its normal position. The mere fact that the kidney did not rise to its normal position does not indicate that it requires treatment. If the kidney is functionating

normally in its malposition, under ordinary circumstances, it should not be disturbed. A few cases have been reported in which a kidney in the pelvis was interfering with pregnancy and apparently was the cause of repeated miscarriages. In such cases it might be advisable to attempt to raise the kidney to a higher position. Ordinarily, it is difficult to change the position of the ectopic kidney because the blood-vessels in the pedicle are short and the kidney is rather firmly fixed. In some cases, however, in which the kidney is producing symptoms such as would be caused by an intermittent hydronephrosis, although the function may be normal, it would seem advisable to attempt to change its position, and possibly to do a plastic operation at the point of obstruction. This was done in one of our cases, and quite a satisfactory result was obtained. In some of the reported cases in which a nephrorrhaphy had been done, it was necessary subsequently to remove the kidney. The problems presented by the ectopic kidney during pregnancy and parturition are often difficult to decide, but fortunately most deliveries are accomplished without surgical intervention. We have not observed a case of pregnancy complicated in this manner, but from reported cases it would seem that the amount of hindrance to labor depends on the amount of narrowing of the true pelvis, and also on the degree of fixation of the kidney. It has been suggested that if the condition is noted early in the pregnancy and if it seems to narrow the pelvic outlet sufficiently to hamper the labor, an attempt should be made to anchor the kidney above the brim of the pelvis. It has also been suggested that a nephrectomy should be done under such conditions, but we believe that in place of doing a nephrectomy which might be quite a serious procedure, that it would be best to wait until during the last stages of pregnancy, and then perform a Cesarean section.

The surgical treatment of pathologic conditions in the ectopic kidney are practically the same as for like conditions in the normally placed organs. In all cases in which there is

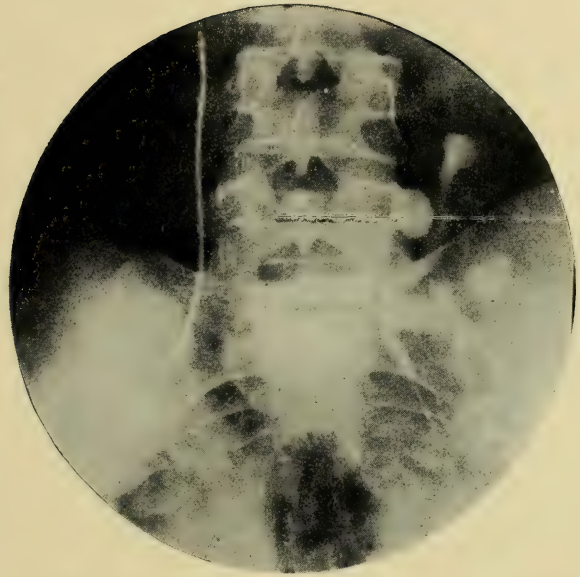


Fig. 1 (154170).—Left ectopic kidney; moderate clubbing and and dilatation of calyces. Lead catheter in the right ureter showing the right kidney in normal position.

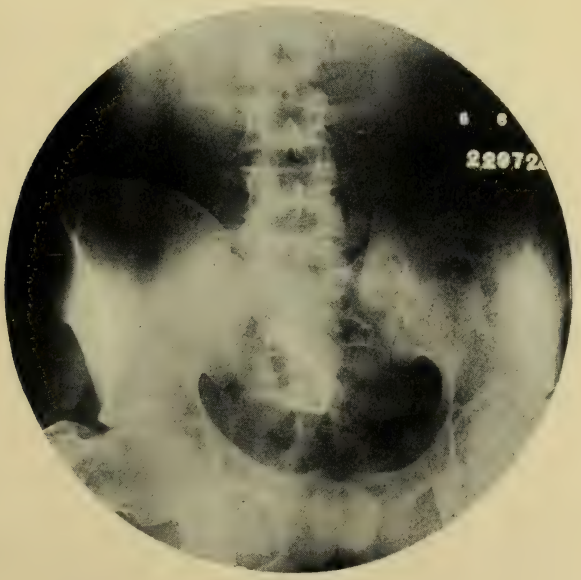


Fig. 2 (229728).—Solitary right ectopic kidney. Pelvis small and irregular in shape situated opposite middle of sacrum. Ureter short and tortuous.

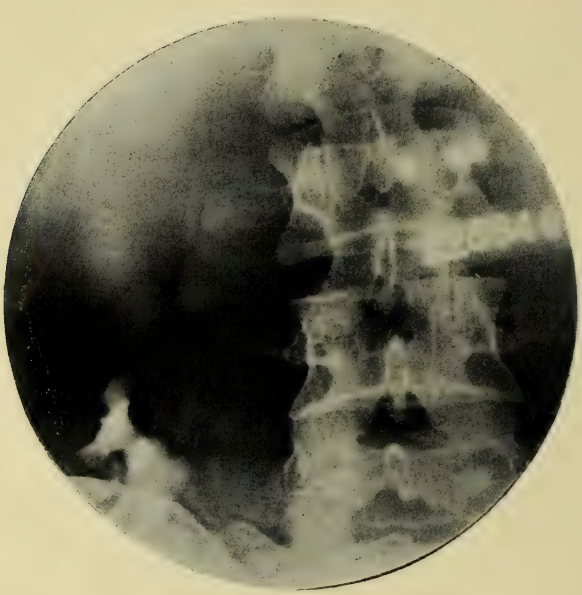


Fig. 3 (225346).—Pelvic outline extending below the crest of the ilium. Right ectopic kidney.

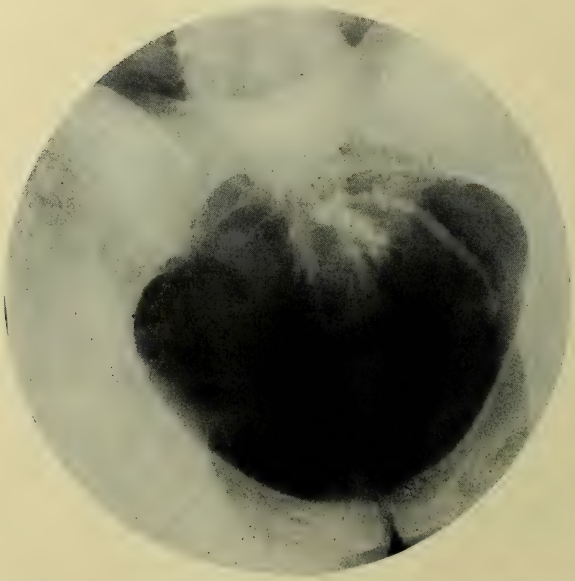


Fig. 4 (17834).—Left ectopic kidney obstruction to left ureter just outside the bladder.

Fig. 5 (184087).—Left ectopic kidney with moderate hydronephrosis.

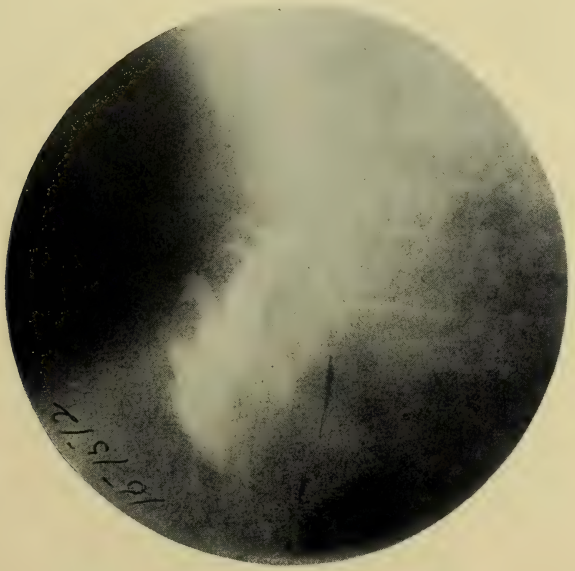


Fig. 6 (151512).—Right ectopic kidney with hydronephrosis.

Fig. 7 (120522).—Right ectopic kidney with reduplication of pelvis.

Fig. 8 (212352).—Left ectopic kidney with pyonephrosis and stones.

destruction of kidney tissues, impaired function, and a normal kidney on the opposite side, a nephrectomy is certainl indicated. Before considering nephrectomy in such cases, however, it is very important to determine the condition of the opposite kidney. In three of our cases, the ectopic kidney was solitary, and in all it seemed to be the cause of the symptoms. Therefore, it is necessary to be very emphatic about the necessity of making sure there is one good kidney before the removal of the ectopic kidney is considered.

Review of Cases. Nine of the 20 cases of ectopic kidney of this series were operated on for some pathologic condition in the kidney.

In one case an exploration was made to determine the nature of the pelvic tumor which proved to be a fairly good kidney, lying within the pelvis. It was freed from its pelvic attachment and a fixation was made as high up as possible. This seemed to relieve for some time the symptoms of which the patient had complained, but she returned in fourteen months with somewhat the same complaint.

In the second case, a diagnosis of a functionless right kidney with hydronephrosis was made. A tumor was also present. An exploration revealed an ectopic kidney. Nephrectomy was done with satisfactory recovery.

In the third case, the patient gave a gall-bladder history. Physical examination revealed a rather firm mass in the right abdomen. Exploration showed the mass to be an ectopic kidney, which was freed and fixed in a higher position. The gall-bladder condition was remedied at the same time. The convalescence was uneventful.

In the fourth case, the patient complained chiefly of female trouble, namely, attacks of pelvic pain on either side which required rest in bed for several days at a time. Examination showed a small mass in the left iliac fossa, and a deformity of the vagina and uterus. Operation revealed a pyonephrotic left kidney. The ureter was about three inches long and there were three renal arteries, all coming from the common iliac.

The kidney was removed. Convalescence was satisfactory except for a phlebitis in one of the saphenous veins.

In the fifth case, the complaint was kidney trouble. Tubercle bacilli had previously been found in the urine and a diagnosis of tuberculosis of the right kidney was made. At operation the kidney was definitely tuberculous, and situated in the right iliac fossa. The blood-supply came from three large vessels from the lower aorta.

In the sixth case, the complaint was of frequent and painful micturition, and a cystocele. The cystoscopic examination showed a pyonephrosis on the right side. The combined functional test was only 35 per cent. in two hours. At operation the kidney, which was found lying in the pelvis, was small, with a hydronephrosis and some infection. At the ureteropelvic juncture was a definite stricture which was incised and a plastic operation done. The immediate convalescence was good.

In the seventh case, the chief complaint was left lower abdominal pain. The physical examination was negative, with the exception of tenderness in this region. Obstruction was encountered 10 cm. up the left ureter and a pyelogram showed that the left kidney was lying in the pelvis, and that the pelvis of the kidney and the calices were dilated. The arterial and venous blood supply was characteristic of the ectopic kidney.

In the eighth case, the patient complained of a combined fecal and urinary fistula in the left inguinal region. The fistula had persisted since an operation for drainage of a large abscess in this region some weeks previously. Soon after drainage was established, stones, urine, and feces began to discharge. Examination revealed an obstruction of the ureter, and x-ray examination showed multiple stones in the pelvis and calices of a pelvic kidney. Two subscapular operations were performed to remove the ectopic kidney. The infected kidney tissues and a large number of stones were removed.

In the ninth case the patient had complained of pain through the pelvis and a left hydronephrotic pelvic kidney was discovered during an exploration. The diseased kidney was removed, and the patient made a good recovery. All of our operated cases have recovered.

In one case an exploration was made which revealed an absence of the right kidney and a congenital malformation of the liver and duodenum. The left kidney was large and was situated in the region of the sacro-iliac joint. Fortunately, the absence of the opposite kidney was discovered before anything had been done to the pelvic kidney.

In four of the series the condition of congenital misplacement of the kidney was discovered during the course of some other operation, and in most instances the position and condition of the kidney probably had nothing to do with the production of the patient's symptoms. In two cases the kidneys were discovered while an operation was being performed for appendicitis, and in both instances the appendix showed definite inflammation. In view of the fact that the symptoms subsided after the appendix had been removed, the indication is that the position of the kidney had nothing to do with the symptoms. One of these patients, a young married woman, came because of repeated miscarriages. The pelvic kidney was thought at first to be an ovarian cyst, but on exploration it was found to be a kidney apparently in good condition. The uterus was lifted up in the pelvis by shortening the ligaments; nothing was done with the kidney. I was unable to get a late report in this case, so do not know whether the condition was remedied. In one case, the pelvic kidney was discovered at the time of making a plastic operation because of congenital absence of the vagina.

In five of the series the malposition of the kidney was discovered in a routine examination by means of a pyelogram. In all of the five cases, the kidney apparently was normal in every respect except position. In two the pelvic kidney was

found to be a solitary kidney. In one there was lack of development in other regions.

In conclusion it may be said that this malposition of the kidney occurs rarely. It may be of interest purely from the anatomic location as it may act and functionate in a perfectly normal manner in this position as well as in its normal location. Under these circumstances it may never be discovered or, if it is found, will require no treatment.

It may be of interest, especially, when it becomes involved in some pathologic process such as hydronephrosis, pyonephrosis or tuberculosis as it may do. Under these conditions the location of the kidney may be misleading in the diagnosis. An accurate diagnosis can be made by an examination of the bladder, ureters and kidney by means of the cystoscope, ureteral catheter and pyleogram. When the diagnosis is established the treatment is the same as for similar pathology in a kidney in its normal location.

PROSTATECTOMY, WITH ITS PREPARATORY AND POSTOPERATIVE TREATMENT

By Bransford Lewis, M.D.
St. Louis, Mo.

If one would do satisfactory and *successful* prostatic surgery he should give close and searching attention to three phases of treatment: (1) preparatory; (2) operative; (3) postoperative. The first of these is by some esteemed too lightly, leading to disaster in individual instances that might assuredly be avoided. Strong convictions on this point inspire serious questioning, for instance, of the propriety of operators making rapid-transit trips into the country, operating and returning home on the same day, without knowing any of the elements of diagnosis or providing any of the various conditions deemed essential to success by practically all of the leaders in this work of the present day. The wonder is that any success can be attained by the use of such precipitate and impolitic methods. In the writer's opinion this is unpreparedness to the degree that seriously prejudices the chances of the patient and brings discredit on a special line of surgery that, under proper and conservative conditions, works wonders for a very miserable portion of humanity.

The most experienced operator cannot always tell, on the first interview with a patient, as to whether an operation will be necessary or even advisable. Many patients with marked prostatic obstruction and in serious condition of

health may be brought to permanent recovery without any operation, and it requires definite study and observation over a number of days to bring these to recognition. In many others—indeed, in a very large proportion of them—even if operation be advisable or necessary, preliminary drainage through the retained urethral catheter is of the utmost importance, converting a critical situation into a satisfactory and safe one; or supplanting agony with quiet and comfort, preliminary to operation. These considerations are vital in their bearing on final success, but are necessarily ignored when the rapid-transit plans alluded to are adopted.

Preparatory Treatment. Besides information on the physical condition and functional activity of the heart, kidneys and alimentary tract required in all such cases prior to undertaking operation, accurate estimates should be made on the following in particular: (1) Hemoglobin percentage; (2) cell count; (3) blood-pressure; (4) phthalein output of the kidneys; (5) urine quantity and amount of solids in twenty-four hours.

Gross deviations from the normal in these should be corrected or improved before operating. Fortunately, this is possible in practically all cases, through the various measures of drainage, heart-toning and alimentary regulation now generally utilized. Proctoclysis, drop-method, of 5 per cent. sodium bicarbonate solution, six hours daily, proves of wonderful efficacy in restoring the functions of a dilapidated old man, undermined by urinary obstruction, retention, infection, pain, recurrent chills and fever. But efficient drainage is the *sine qua non* of all requirements, before, during or after operation. Interrupted catheterization in no sense fulfils the demands in urgent cases. It occasions much suffering each time it is used, in the badly inflamed cases; and is often attended with steadily increasing difficulty of introduction, all of which is done away with by binding the catheter in the urethra with string and a few

pieces of ahhesive plaster judiciously applied. Nothing gives such immediate comfort as this, in many instances; and once attained, such drainage can be continued until the critical situation is over and all things are favorable, or as nearly so as they may be made for the operation. It gives opportunity for daily irrigations whose effects may be both soothing and antiseptic. In a particularly difficult and complicated case of seventy years of age the writer kept a catheter in the urethra for nine months before bringing the patient to a condition appropriate for operation, after which the operation was done with success and prompt recovery.

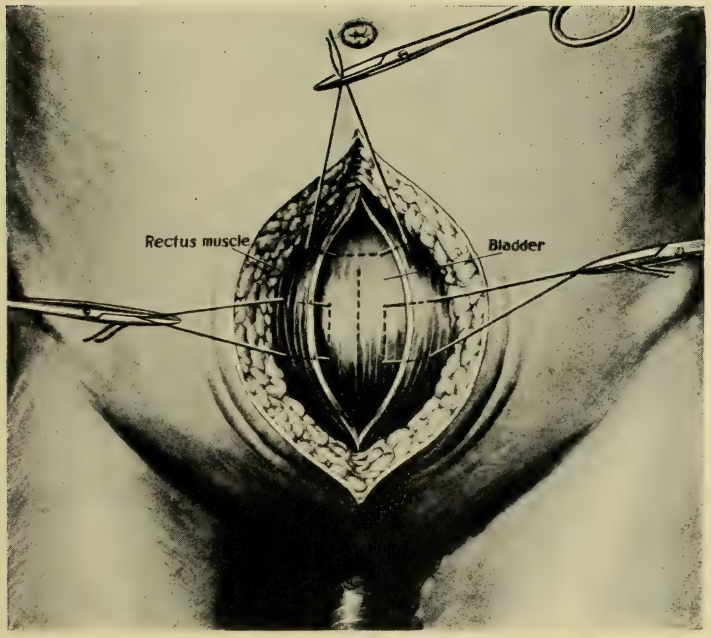
Hemoglobin above 60 per cent. is favorable; 50 per cent. is questionable; 40 per cent. unfavorable; 30 per cent. fatal, in connection with prostatectomy. While the phthalein output should be above 30 per cent. for two hours to present a promising outlook, I believe the requirements are not so rigid as with the hemoglobin percentage, and that patients can be carried through to success in the face of very low phthalein percentage, if all precautions are taken in regard to preparation, anesthesia and postoperative care. At least we have had such experiences. Low phthalein returns do not lead us to abandon operation, but impel us to adopt all the different measures of safety and conservatism that have been instrumental in lowering the death-rate of prostatectomy of late years.

A peculiar fact pertaining to some cases of chronic prostatic obstruction, apparently in fair general condition, is that they are really on the verge of a renal breakdown, ready to be toppled over into urinary suppression and death by any untoward or unusual circumstances. This portentous condition (impending acidosis) is often to be detected not so much by the quantity of urine passed in twenty-four hours as by the quality: An enormous quantity of clear, limpid urine is poured out, but of low specific gravity (1.003 to 1.005) and lacking in solids and urea-content. Acetones may be present. Beware of such cases, and install the thera-

peutic measures with the utmost caution from every standpoint. Activity or inactivity is liable to be equally disastrous. The patient has simply postponed the definite effort at recovery for too long a time. He has reached a dangerous state and does not for a moment suspect it. I have seen such patients dead in two or three days from the time of the upset, and without any operation being undertaken or any serious measures being adopted. Suppression of urine, uremia, acidosis—whatever the terms applied—the outcome is death, and represents the fallacy and danger of procrastination.

Choice of Operation. Without going into a discussion of the merits and demerits of the two methods of removal of the prostate, suprapubic and perineal, the writer, after a considerable experience with both, has adopted the suprapubic method as the one of choice *because it gives the better results*. It is free from a number of momentous objections that pertain to the perineal operation, such as ineffectual urinary control, sexual disability, urethrorectal fistula, etc.

One- or Two-stage Operation. While a one-stage suprapubic prostatectomy may with confidence and safety be carried out in a patient of middle age and good general condition, there is no doubt about the marked and distinct advantages presented by the same operation done in two stages in the decrepit patient of advanced years and weakened resisting powers. The opportunity presented by the two-stage operation of establishing a firm adhesion between bladder and abdominal walls is scarcely less valuable than that of establishing suprapubic drainage. Infection of the loose connective tissues surrounding the bladder and extensive suppuration in these is one of the most serious dangers attendant on suprapubic work. Once established, such suppuration is difficult of control and the condition may rapidly become formidable. The ounce of prevention consists in attaching the bladder firmly and permanently to the abdominal wall around the opening in the bladder by means of chromatized catgut sutures.



Showing fixation sutures.

Since adopting this technic, further described below, the writer has had no semblance of deep spreading infection in any case. Its protecting influence was markedly shown in a recent case in which through inadvertent deviation from the prescribed technic an infection of the suprapubic wound occurred; but this infection did not spread beneath the muscles or in the cellular tissues about the bladder because of the close and firm attachment between the bladder and abdominal wall which had been provided.

Because of these considerations and their bearing on events subsequent to the operation the author deems exactitude of technic logically carried out as well worth while, even though they may seem more formidable than the ones of former days for getting into the bladder. It is easy enough to get into a bladder, but getting out again with a healed wound and a recovered patient—that is the question demanding consideration.

Choice of Anesthesia. If the patient be vigorous in health and condition, ether may be given with impunity; but if very old, debilitated or septic, it may not be justifiable to deprive him of the well-defined advantages presented by local anesthesia for the first stage, and a very transient gas or ether anesthesia, or preferably caudal (sacral) anesthesia, for the second. This plan is practically free from shock in all cases, and there is seldom disturbance of the alimentary tract.

Spinal anesthesia is commended as serviceable by some operators, but the writer views it as the most dangerous of all methods of anesthesia. His personal acquaintance with some seven or eight instances in which death was attributable directly to spinal anesthesia used by operators well versed in its technic has led him to this conclusion. He knows of no death so far reported from the use of caudal anesthesia, although there have been instances in which physiological effects have been observed.

Supportive Medication. Very many cases demand the supporting influence of digitalis preliminary to operation, of diuretics and the free ingestion of fluids, water, milk, buttermilk and possibly pituitrin hypodermically to arouse alimentary activity. A laxative effect is preferable to too much purging before operation.

Operative Technic. *Two-stage Operation. First Stage: Local Anesthesia.* Light nourishment is not objectionable previous to transferring the patient to the operating room.

1. Hypodermic of $\frac{1}{4}$ grain morphin and $\frac{1}{150}$ grain atropin fifteen minutes prior to operation.

2. Give the bladder a final irrigation with warm boric acid solution, retaining the catheter in the urethra by means of a small strip of adhesive running from penis to catheter. Leave 6 or 8 ounces in the bladder. Iodin to the skin.

3. Using novocain and potassium sulphate solution (2 per cent. each, equal quantities) inject a linear area about three or four inches in length in the midline of the skin above the symphysis pubis (Schleich method). Follow immediately with an incision through this line down to the rectus muscles. Separate these in the midline by fingers and scalpel handle, repeating the injections of anesthetic fluid as often as may be necessary to avoid pain and apprehension on the part of the patient. It is unnecessary to cause pain in this procedure.

4. When not objectionable from the standpoint of obesity, difficult respiration, cardiac, renal or arterial complications, the patient is now placed in a moderated Trendelenburg position. It is probable that the Trendelenburg posture is not as innocuous as it is generally considered to be, so that its duration should be shortened as much as possible. It is desirable to have the dome of the bladder project well up into the wound. This may be effected by adding, if necessary, a few ounces of fluid to the contents of the bladder through the catheter which still lies in the urethra.

5. At the bottom of the wound and still covering the

bladder are the loose prevesical tissues and the lowermost fold of the peritoneum, so merged together that they are not always distinguishable. Not a few good operators have inadvertently cut the peritoneum and have had to take time to stop and sew it up—an unnecessary delay. The writer avoids this by invariably laying aside the knife and using the gauze-covered forefingers to separate the tissues, strip up the peritoneum and definitely expose the bladder. The latter is recognizable by its muscular bundles and large veins. Three retractors maintain the exposure: right, left and upward, the latter with a piece of gauze under it to protect the peritoneum, which is pushed well upward.

6. Then, removing one lateral retractor, a chromatized catgut "fixation suture" is placed. It is passed through the fascia and muscle (rectus) of one side, then penetrating the full thickness of the musculature of the bladder, at a point three-quarters of an inch from the midline, it is directed downward for three-quarter of an inch before emerging, passing again through the rectus muscle and fascia of the same side. Another suture is applied similarly on the opposite side, after which a third is applied crosswise above, just below the margin of the peritoneum. These three sutures when tied later draw the bladder up squarely against the under surface of the abdominal wall, making a firm agglutination that prevents the burrowing or spreading of infection that is one of the most formidable complications of suprapubic cystotomy. At present they are untied and are used as anchorages on the bladder wall. The bladder is now emptied by attaching a long rubber tube to the catheter and siphoning the contents into a drainage vessel. This allows the apex of the bladder to sink down into the pelvis, but it is readily brought back and controlled by means of the three fixation sutures.

7. A narrow sharp bistoury is made to puncture the bladder wall (always anticipating with local anesthesia); the incision is extended above and below sufficiently to provide for the

easy introduction of a finger and, later, of the large Marion drainage tube. By siphoning the fluid out before making the incision a relatively dry operative field is obtained instead of the sloppy one usually encountered in cystotomy.

8. Through the bladder wound the offending prostate is palpated; the catheter is recognized and indicates the exact location of the inner urethral orifice, and the presence or absence of a foreign body is determined. The catheter is then removed, being no longer of use.

9. The Marion tube, containing a perforated stopper and catheter is now inserted into the bladder. The three fixation-sutures previously placed are tied, drawing the bladder firmly against the abdominal wall as before described and obliterating spaces for seepage. The long ends of these sutures may be tied about the Marion tube for anchorage. The remainder of the wound is brought together, the muscle layers with catgut, the skin with silk-worm gut. It is often advisable to place a small cigarette drain in the lower angle to drain the prevesical space. Dress and return to bed.

10. For effecting continuous drainage a rubber tube is attached to the Marion tube catheter, intermittent suction being added by means of a Bremerman apparatus or some similar appliance. The patient is advised to change position occasionally from his back to either side, and liquids or light nourishment are given from the beginning, there being no shock or alimentary disturbance to deal with. Any undue amount of pain is controlled with codein or morphin, and continuation of the proctoclysis, six hours daily, is wonderfully efficient for promoting activity of the kidneys.

Operative Interval. From the first to the second stage of the two-stage procedure a week or two weeks may elapse, according to the condition of the patient and the rapidity of his recuperation from previous disability. Improvement may be noted not only in his daily declarations on the

subject but also in the responses to the several laboratory tests.

Second Stage. At the end of this interval, when conditions are found satisfactory, it is proper to carry out the second stage of the operation, namely, the removal of the prostate.

1. With the patient under gas-ether, or simply ether anesthesia and again in the semi-Trendelenburg posture if permissible, the Marion tube is removed. Its ample diameter has maintained such a good-sized opening into the bladder that it may be unnecessary to again enlarge the wound except very little at its central portion. The forefinger of the left hand is inserted into the rectum to afford counter-pressure and to elevate the prostate into the wound.

2. If we are dealing with a "small hard prostate" its mucosa may be dense and resistant to the attacking finger, in which case it may be of advantage to use the double cutting blades for slitting the prostatic urethral mucosa, as first suggested by Spitzer, and as modified by the author. This admits the glove-covered finger to the line of cleavage to better advantage in certain cases. Cleavage is best begun at the prostatic apex on one side, the finger separating and at the same time hooking the offending lobes backward (upward). No objection can be made to the endeavor to bring out the prostate in one or two pieces, although this is not always feasible. A medium-sized lobe-forceps held by an assistant and grasping a recalcitrant lobe sometimes gives gratifying service and permits the peeling off of attached mucosa. Every piece of prostatic outgrowth should be removed, including that under the trigone.

3. Some oozing or bleeding may follow the removal of the lobes. It may be controlled in either of several ways: Direct suturing; packing with gauze; or preferably, temporary hot-gauze pressure, followed by the placing of a Hagner or Pilcher rubber air-bag, with which continuous pressure is made against the walls of the prostatic cavity for twelve to

twenty-four hours, relaxation being permitted when the risk of bleeding has subsided. If the bleeding should be renewed at a later time it is easy to again inflate the bag and reëstablish the pressure. If there is no serious bleeding and the pressure-bag is omitted the writer is accustomed to place a retained catheter in the urethra at this time, adjusting it perfectly by means of a silk suture placed through its eye-end, drawn out of the suprapubic wound and affixed to a strip of adhesive plaster attached to the abdomen. The placing of this catheter at this time is for the purpose of avoiding the necessity of introducing it one or two days later when the various conditions are less favorable. It is highly objectionable to try to pass a rubber catheter through the recently wounded prostatic urethra, the walls of which are raw and very susceptible to infection.

4. The Marion tube is again made to drain the suprapubic wound at least twenty-four hours, serving for easy removal of clots in case of necessity, and the catheter it contains makes direct connection with the long rubber tube leading into the drainage-bottle. Interrupted suction as before is utilized for inducing good drainage.

5. Suturing of the Wound: The opening in the bladder is first narrowed by chromic catgut suturing until it hugs the Marion tube snugly. The muscular layers of the wound are brought together with the same material, after which interrupted sutures of silk-worm gut are placed through the skin, one of these being tied around the Marion tube for anchorage. It is considered essential to leave a small cigarette drain in the lower angle of the wound, at least as deep as the prevesical space, to be removed within the first day or two.

After-care. Renewal of the proctoclysis (sodium bicarbonate solution 5 per cent.) may profitably be instituted on returning the patient to bed. This supports both renal and cardiac activity. Hypodermics of ampoules of pituitrin every four hours will have a similar influence on the intestines, avoiding stagnation and flatulence. These three functions—

of the kidneys, heart and alimentary tract—are of supreme importance in the next three or four days. If they are kept intact there is little likelihood of anything going wrong.

The patient should be encouraged to take fluids as soon as the stomach is settled, and to turn on either side, as well as on the back. Sedatives are indicated if the patient is in pain or unable to sleep; codein or morphin for the former; and veronal and trional, 5 grains each, at bedtime, for the latter.

The Marion tube having performed its office of protection against clot formation is removed in the first twenty-four hours, being replaced with a smaller elbow-tube or large catheter; or if conditions seem especially favorable, dependence may be placed for drainage on the catheter that was tied in the urethra after the operation. Closure of the bladder wound may be expedited by tying at this time (second or third postoperative day) the sutures attached to each side of the bladder wound and left long for that purpose.

Naturally one must use judgment in adopting one course or another, always acting on the safety-first policy with regard to drainage and possible infection. Without free and adequate drainage complications are sure to arise. To secure this free drainage some surgeons go to the length of leaving the suprapubic wound wide open and without a tube of any sort, the urine seeping up into thick pads of absorbent cotton that obviously require frequent changing.

This seems to the writer a most miserable and unwholesome plan and as unnecessary as it is unattractive. As a matter of fact a mild degree of infection nearly always occurs in that portion of the wound through which drainage is maintained, but with the protecting measures fully carried out as described it is practically never serious and should not retard the closure of the wound, which should occur in from two to three weeks. During this time the urethral catheter is used for continuous drainage. Being already in place the evils of attempting to introduce it under adverse conditions (through a disorganized prostatic urethra, etc.) are avoided,

and its cleansing is easily accomplished by drawing it up through the wound by means of the anchor-thread previously mentioned. This gives complete control and without any disturbance. After a week or ten days, when the wound becomes small, the thread is cut off and the catheter is still retained, this time by means of adhesive strips on the penis. The patient is permitted to sit up in bed about the fourth day after either the first or second stage of operating, but nothing is to be gained in having him get out of bed at this early period, as claimed by some operators.

Within twenty-four hours after operation it is found useful to add 1 or 2 grains of calomel, in ½-grain doses, to the pituitrin, followed a few hours later by a mild saline laxative. After this a daily dose of one of the neutral oils is serviceable. If there should be any postanesthetic vomiting the head of the bed may be elevated twelve inches (Fowler's position) for twenty-four or thirty-six hours.

DISCUSSION

Dr. John R. Wathen, Louisville, Ky.—I agree with the essayist when he says that the main thing in prostatic surgery is proper drainage and the avoidance of infection. As a general thing, the fundamental principles of prostatic surgery are accepted today by all surgeons, so that there is not much difference of opinion. The question, though, is how we carry out these principles. I differ with the essayist when he makes the statement that the indwelling catheter should remain in the urethra for a considerable time, even for months, as in one case reported by him. Personally, my experience has been that the indwelling catheter is not borne well by the average patient. Some patients can hardly stand it at all.

As to the type of operation, I believe suprapubic cystostomy under local anesthesia is the method of choice, for preliminary drainage. I use the De Pezzer catheter, introduced through a small opening in the bladder wall, and in that way prevent infect-

ing the prevesical space, and allow the catheter to remain in a week or ten days. I prefer the two-stage operation, as it allows time to better study our patient and prepare him for the final and more radical operation.

In regard to drainage after the operation, I differ with the essayist in regard to the size of the modern drainage tube. It is too small. If we use a tube, as originally advocated by Freyer, of London, with a long pair of tissue forceps, we can extract the clots. The bladder should not be irrigated for the first twenty-four to forty-eight hours after operation. The clots should be removed and drainage should be established. The best and most satisfactory form of drain I have used is that which has been devised by Dr. Davis, of the Brady Institute, Johns Hopkins Hospital. It will keep the patient dry and prevent infection. One advantage of the two-stage operation is the prevention of infection, and that is the key to the situation. In the two-stage operation, if we do it under the most careful precautions and avoid letting urine enter the prevesical space, when we place a catheter in the bladder we will allow granulation tissue to spring up, and will avoid any possibility of infection in this space. This has been demonstrated by Crile in his two-stage operation on the larynx. It paves the way for the avoidance of infection; later on we can enlarge the wound with impunity and remove the prostate.

Dr. Robert T. Morris, New York City.—I agree with most of the points brought forward by Dr. Lewis, but for the past two or three years I have gradually aimed at simplicity concerning drainage after the operation. I have used less complicated apparatus, and little by little have arrived at a method which is perhaps unsafe, yet for the past three or four years it has not proved to be unsafe. After the suprapubic operation I like to fold the ragged fragments back into place pretty snugly and pack them down with neat folds of iodoform gauze, leaving one end of the gauze protruding from the abdominal wound; and then for external absorbent dressing, I use little packs of sphagnum moss; one may buy it at any stable supply place; it comes in large bales for horse stables, under the name of peat moss.

There are some thirty species of this sphagnum moss, some having a greater degree of capillarity than others. Dry lumps of moss when put into a tub with a saturated solution of boracic acid will swell up into a large mass, and after that may be taken

out and partially dried. The boracic acid will be precipitated upon the moss in little adherent crystals, so that a partially dried large mass of sphagnum may be kept in a suitable receptacle. It is put loosely in gauze bags and used for taking up the flow of urine, and the nurse may throw away these bags as fast as they become saturated. The wound keeps practically aseptic, provided that we use urotropin for a few days, depending upon it for the *vis a tergo* in the way of asepsis, and keep a layer of iodoform gauze next to the wound. Proctoclysis is in order. I have been depending upon sphagnum moss a good deal after suprapubic prostatectomy, and my patients have had great comfort from it. The rubber bladder tubes that cause pain and the bottle outfit are done away with. The patient is free to move about in bed as much as he pleases.

Dr. Francis Reder, St. Louis, Mo.—Our responsibility for the mortality in prostatectomy rests principally with hemorrhage. As far as the operative procedure is concerned, that is wholly a matter with the individual operator. I prefer to enucleate the gland with an ungloved finger. A forceps with a sharp-bladed end to incise hard and resistant tissue may prove advantageous. It would appear to me, however, that prostatic tissue dense enough to require incision for the finger in search of a cleavage point would present so dense a fibrous state throughout the gland that a mere cut with the bladed forceps would avail but little. Such conditions usually call for the rongeur.

Recently, I read with much interest the discussions on the after-treatment of prostatectomy by a number of urologists. Reference to the Hagner bag was frequently made. The majority gave great laudation to this appliance. My experience with the Hagner bag has been such that I would not care to undertake a prostatectomy without it. All rubber appliances are more or less disappointing. That is because the "life" of rubber is short. It is sometimes difficult to get a Hagner bag and when one does obtain one it may not be in the best condition. The bag as it is made is rather hard and a bit clumsy. When introduced it frequently causes pain. It occurred to me to make my own Hagner bag, and it may be of interest to you to know how it is made. I take a toy balloon, such as one inflates at pleasure, and fasten it to the open end of a Nélaton catheter. Its introduction is simple. A sound with an "eye" in the beak is passed into the bladder and the beak made to protrude in the

suprapubic wound. The thread which has been previously passed through the blunt end of the catheter is then threaded through the eye and is secured. The sound is withdrawn, bringing the catheter along. The bulbous end of the catheter is now cut off, so that an ordinary atomizer bulb may be joined to the catheter. Inflating the balloon is an easy matter. With the finger in the bladder upon the balloon the degree of inflation can be readily judged. The necessary traction is made on the catheter, which is clamped with an ordinary hemostat to prevent the escape of air. With an adhesve strip the catheter is secured to the thigh. Such a bag is soft and cannot injure the tissues by too much or too prolonged pressure. I have left the appliance in place as long as forty-eight hours. As I have previously stated, bleeding in these operations causes the operator much apprehension. With the Hagner bag this danger is to a great extent eliminated.

Dr. James E. Thompson, Galveston, Texas.—I should like to say a few words about prognosis. Dr. Lewis forgot to mention one of the most important tests we have in forming an opinion as to prognosis after these patients are operated upon. The value of the hemoglobin percentage, of the urea output and of the phthalein output are all important, and the most valuable test is the estimation of the blood urea. The more a surgeon places his reliance on this the more will he value it. It will often save him from a serious catastrophe and will always give him a fairly accurate prognosis of what is likely to happen if the patient is subjected to a major operation. One may find the output of urea and the percentage of phthalein output fairly good, but when one estimates quantitatively the blood urea he will find it greatly increased. We may assume that a patient is in no serious danger whose blood contains 50 mg. of urea per 100 c.c. of blood. Any increase beyond this should be noted carefully.

In two of my cases there were respectively 160 and 190 mg. I considered it unsafe to do anything except to drain the bladder by a catheter, and I was able to warn the patient and the patient's friends that the cases were very serious. In both instances death followed simple suprapubic drainage through a catheter inserted along a cannula; in one case in four days and in another case in one week. I believe that in both of these cases, unless I had been warned as to their gravity by the excessive amount of urea in the blood, I should have been tempted to

have looked forward to the possibility of performing a radical operation.

Dr. George A. Hendon, Louisville, Ky.—I feel a little timid about relating the experience I have had in connection with prostatectomy, because it is entirely different from the reminiscences that have been related. However, I have never found it necessary to use any special method of irrigation or drainage. My method in suprapubic prostatectomy is to pack the cavity lightly from which the prostate has been removed with iodoform gauze or with plain gauze and allow the ends to protrude from the suprapubic incision. But before doing so I introduce the ordinary Nélaton catheter in the bladder. In the first twenty-four hours quite a lot of clots may form, but by irrigating with six to twelve ounces of warm boracic solution the lumen of the catheter is kept open and no clots form. All drainage takes place through the catheter in the urethra, and that is collected by a urinal between the patient's legs. On the third day I remove the gauze packing and all the drainage comes below through the natural way, and I have not had any trouble or hemorrhages or anything to make me dissatisfied with this method of treatment.

Dr. Lewis (closing).—If every surgeon did not have his own notions and ideas regarding such a subject as we are discussing we would never have any individuality in these cases. I have been considerably interested in the condemnation by a good many of my surgical friends of the use of the indwelling urethral catheter. I have had case after case in which I believe from the precarious situation in which they were with reference to the functional activity of the kidneys and general condition, if suprapubic prostatectomy had been undertaken without preliminary drainage (usually by indwelling catheter) there would be doubt about their going through the operation.

Dr. Hall.—I wish you would tell us how you overcome the irritation that takes place on the second or third day with the catheter in the urethra, and what means do you institute to allay that irritation?

Dr. Lewis.—I want to be absolutely frank and fair to both sides when I say there are a very few cases in which I find I am not able to use the indwelling catheter in the urethra. It is not

well supported in perhaps one case in ten to fifteen; but in the rest of them I am able to use it with great satisfaction. I had recently a patient who has not recovered from a suprapubic prostatectomy, who a year or two ago had been in a sanitarium, thus indicating his unstable mental state and extreme nervousness. When I first saw him they had been catheterizing him three times a day; he had fifteen ounces of residual urine of vile odor. I put in an indwelling catheter. The patient said it was absolutely out of the question; that he could not stand it. I said: "You have been conducting your own ceremonies in this case for five years; will you permit me half a day to conduct them?" I introduced the catheter and within an hour he was convinced of the propriety and tremendous benefit derived from it. We kept the urethral catheter in for two weeks while getting him ready, and I did not even have to do a two-stage operation. This man (mentioned in my paper) who, for nine months had the indwelling catheter, had myocarditis; his kidneys were in bad condition leading to a number of uremic attacks; he had alimentary obstruction. One prominent physician of Chicago saw the patient in consultation, and he told the family that the man could not live longer than a month, possibly not more than a week or two. Accordingly, the family bought the burial clothes for that indiviual. But he recovered, and I ascribe his recovery largely to the use of the indwelling catheter, which I kept in for nine months. I have a case now in which I could not use it, but resorted to suprapubic drainage under local anesthesia; but I much prefer to use the indwelling catheter where it is acceptable.

IRRITABLE BLADDER IN WOMEN

By Charles A. L. Reed, M.D.
Cincinnati, Ohio

Frequent desire to urinate, slight or severe pain with or without straining when urinating, sometimes made worse by emptying the bladder and very generally associated with persistent discomfort in the bladder, sufficient frequently to interfere with sleep, are the symptoms of the still other symptom that is here meant by the term "irritable bladder." The cases are generally of long standing and come with a history of prolonged and various treatment including kidney remedies, washings of the bladder, correction of the womb, operations on the perineum or rectum, or both, and, finally, if not all the time, opiates, sometimes resulting in drug habituation. As a rule these patients have lost flesh and have become highly nervous, resulting in their frequent classification as "hysterics." They are, as a rule, sore trials to their medical attendants, the last of whom in desperation has sought relief at the hands of a consultant.

These cases represent real responsibility and call for the most serious and painstaking investigation on the part of those who assume their care. It is this fact that has caused me here briefly to review the real significance of the symptom, which, although a commonplace in our consultation rooms, is one that taxes diagnostic ability to determine not only the various pathological conditions upon which it may depend but the actual condition upon which it does depend in the given case.

General Diagnosis of Irritable Bladder. In looking for the pathological cause of the symptom, we must remember that the underlying condition is one of abnormal sensibility of the lining membrane of the bladder itself. When we go back of this fact we may do well to recall that it may be caused by conditions either outside of the bladder or inside of it. Those that are outside of the bladder generally produce their effect by pressure, and are, for the most part, pregnancy, displacements of the uterus, displacement of the intestines or tumors of either the womb or ovaries. Displacement with sacculation of the bladder itself, often associated with a torn perineum, is to be taken into account. Infection of the Fallopian tubes, with resulting pressure or adhesions involving the tubes, ovaries and bladder in one mass, is a frequent causative condition. Adhesions between the bladder and intestines induced by the formation of plastic exudate on the peritoneum of the bowel as the result of a static mesenteric circulation or as a consequence of previous operation have been repeatedly observed in my own work. Among the conditions that arise within the bladder, and that have a causative bearing on the symptoms under consideration, may be enumerated acute infection, generally gonorrheal, but often of the mixed type, the latter depending, I am sorry to say, all too frequently upon the careless use of the catheter. Tubercular infection, sometimes primary but generally secondary to that of the kidney, is to be taken into consideration. Neoplasms, both benign and malignant, and calculi may be responsible for the symptom. Four of my cases, with prolonged previous histories, were readily relieved after discovering that they were caused by diverticula, and two others had sacculated stones. In a few cases the frequent urination was due to the fact that the bladder had become too small, due to contraction following severe acute cystitis that had been treated by caustic solutions. In a certain proportion of cases, circumscribed and very distinct ulceration, the so-called Fenwick ulcer, near the outlet, was

found to be the essential pathology. I have mentioned ulceration last in this brief and incomplete list of intravesical conditions because I wish to devote the most of my paper to another and quite distinct form of ulcer that I am sure deserves more consideration than it has yet received at the hands of the profession. I allude to the condition that has been described by Dr. G. L. Hunner,[1] with such originality and such distinctness that it has been called the "Hunner ulcer," and that I would here designate by the same name if I were not opposed to calling any condition, anatomical or pathological, by the name of any man. Dr. Hunner himself has called the ulcer "elusive," because of the frequency with which it eludes actual observation in the course of cystoscopic examination.

I think it better, however, to use a term which describes some physical and consequently recognizable feature of the condition. I shall therefore call it the "punctate" ulcer of the bladder, as being more accurately descriptive of its size and appearance.

Importance of Differential Diagnosis. Before doing so I wish to speak of the importance of a subject that it is not necessary even to mention at this time, but that it is necessary to call earnestly to the attention of the early attendants upon these cases, and that is the essential necessity of complete early examination of all bladder cases. It is not sufficient that a patient with bladder symptoms should merely recount her complaints and receive a prescription. Chronic irritable bladder, it should be taught, always depends upon some definite local pathology, and, as I now believe, in the majority of instances, upon the generally overlooked punctate ulcer. While this condition can generally be

[1] A Rare Type of Bladder Ulcer in Women, with a Report of Eight Cases, Tr. Southern Surg. and Gynec. Assn., 1914, 27; Boston Med. and Surg. Jour., 1915, 172–660; Rare Type of Bladder Ulcer, Jour. Am. Med. Assn., January 26, 1918, lxx, 203. Elusive Ulcer of the Bladder, Am. Jour. Obst., September, 1918; Tr. Am. Gynec. Soc., 1918.

inferred from the history of the case, its importance, in view of the pain and impairment of health realized, in view of the treatment required and benefits to be secured, demands that it never be left to a presumptive diagnosis.

Cases of Punctate Ulcer of the Bladder. This condition having been brought forcibly to my attention by Dr. Hunner's contribution to the American Gynecological Society in May, 1918, I recalled 5 cases of irritable bladder, all of them of long standing and distressing character, in which I have failed to bring more than merely temporary relief by so-called conservative methods. I accordingly sent for them to come in again for further investigation and more radical treatment. One, I found, had died from endocarditis following a prolonged and severe multiple arthritis. Four very eagerly responded to the overture. One of these 4 is shortly to submit to operation. The other 3 cases gladly submitted to operation, and their histories are here briefly submitted as a basis for my further consideration of the punctate ulcer of the bladder, its pathology and diagnosis and its treatment by excision of the ulcer-bearing area.

Case I.—Mrs. L., aged thirty-four years, mother of two children, was referred to me by Dr. William H. Tarvin, of Covington, Ky., in June, 1912. She gave a history of nocturnal enuresis in childhood, for the relief of which, at the age of fifteen, she had submitted to an operation for phimosis. The experience, she said, forced her to control the enuresis only, however, by getting up from three to five times during the night. She was told that marriage would help, but, and although she had since passed through three pregnancies, the painfulness of the bladder had continued with increasing severity. She had exhausted all the kidney medicines on the quack list and had gone to various physicians, regular and irregular, at home and abroad. When she first came to me she complained of pain in the rectum and perineum as being more troublesome than that in the bladder itself. She, how-

ever, had to urinate on an average of once every hour, getting up four or five times at night. As a result she had lost flesh, was highly nervous and wore a haggard look. Examination showed the rectum free from lesion; the perineum, which had been torn and repaired, was normal, and there was no cystocele. Intense pain in the bladder was elicited by bimanual examination, and even on external pressure above the pubes. The urine was clear, acid, free from albumin and sugar, and with only a slight cloud of mucus. Microscopic examination was not made, and if it had been the real significance of its possible findings would not then have been appreciated. Careful cystoscopical examination revealed a few slightly granular bodies on the rather pale mucosa of the anterior wall. These bled on the slightest touch with a cotton applicator. I looked upon the case as one of primary tuberculosis, which I construed as having occurred late in the history of an old cystitis. I resolved on what then seemed to be really radical measures. I treated the condition with thorough gauze curettage over the whole surface and constant drainage, with washings of silver nitrate solution and lavage, with sodium bicarbonate in the intervals. The result seemed almost magical, and the patient for the first time in years was free from pain and could sleep all night. This lasted for nearly three months, when all the old symptoms rapidly redeveloped. Two months later she came back and asked to have the treatment repeated. The original appearances were again found and again treated as recounted, this time, however, with less satisfactory results. From that time on she was in a condition of chronic distress, which exceeded only that of her physician, who, with his consultant, had to listen to her complaints while having no means to relieve her.

June 10, 1918, she returned at my solicitation. I could now find not only some of the old granular bodies or cystic follicles, but a number of punctate ulcers on the anterior wall of the bladder, which area under air-pressure was at first pale and then red, and then could be observed to crack

slightly and bleed. The urine from each of several voidings was found to look clear, but after being centrifuged was found to contain occult blood. These findings with the previous history gave me a positive diagnosis of punctate ulcer, which Hunner had conclusively demonstrated to be incurable, without excision of the ulcer-bearing area. The operation was accordingly done June 16 by the extraperitoneal method, essentially after the manner described by Hunner. The convalescence was uninterrupted and the patient went home at the end of three weeks without a symptom of her former trouble. There has not been the slightest return in the six months that have since elapsed.

Case II.—Miss G., aged forty-three years, teacher, was referred by Dr. F. L. Mitchell, of Liberty, Ind., in August, 1915. This patient had suffered with "irritable bladder" for nine years, during which time, like all others of her class, she tried all sorts of treatment. It seemed as if nothing had been omitted from legitimate medicine to the veriest quackery, and I regret to record that the veriest quackery had been quite as successful as the most legitimate medicine. My own efforts to relieve her, except temporarily, were another addition to the chapter of failures. The relief that I did give for a time was realized by gauze curettage, cauterization with 10 per cent. silver nitrate solution, subsequent alkaline irrigations and constant urethral drainage. Only a few weeks of comfort elapsed before the symptoms returned, and they continued with such increasing severity that the only relief was realized from opiates, the doses of which had grown to 2 grams of morphin at least three and sometimes four times a day. When I sent for her to come back I found a positive diagnosis of punctate ulcer according to the methods and indications given in this article. Excision of the ulcer-bearing area was done June 23, 1918. In this instance, however, warned by the hemorrhage in my former case, a complication from which Hunner had lost one of his patients, I did a direct transperitoneal operation by the

method which I shall describe. The patient made an uninterrupted recovery, and has since been entirely well.

Case III.—Mrs. T., aged fifty-seven years, widow, the mother of eight children, was referred to me December 19, 1916, by Dr. John G. Reed, Elmwood Place, Ohio, who had just been called to the case. The bladder symptoms for which she came had been persistent for fifteen years. She had also been crippled with rheumatism for a number of years and walked with a cane. This circumstance attracted attention to her teeth. She had marked pyorrhea of long standing, with several apical involvements. This circumstance is mentioned only because of the possible etiological bearings upon the bladder condition. The cystoscopical findings were those of what I by that time had come to call chronic granular cystitis. She, too, was treated as Cases I and II had been treated, by gauze curettage, styptics, alkaline irrigation and lavage. This was followed by very marked relief, which lasted for about two months. She then became worse than before and was inclined to blame me for the result. She, like the second case, could get sleep only by the use of opiates. The reflex pain into the rectum and perineum was especially distressing, and was becoming increasingly and intolerably worse. Her general health was breaking rapidly when I requested her return. The examination now revealed all the characteristic conditions of punctate ulcer over a large area of both the anterior wall and the vertex. Excision of the ulcer-bearing area was done July 1, 1918. The transperitoneal method was employed. The extent of the resection was so much greater than in the preceding cases that I feared the remnant of the bladder could hardly meet its functional requirements. The surgical recovery was without incident. All tenderness of the bladder had subsided by the end of the fourth week. She, however, had yet to get up once or twice during the night in consequence of the diminished capacity of the bladder. This lasted in a diminishing way for about two months more. She now

retains 8 ounces comfortably and 10 ounces without much effort.

Symptoms and Diagnosis of Punctate Ulcer. The diagnosis of punctate ulcer is based upon a consideration of the previous history of the case, the present symptoms, the urinalysis findings and the cystoscopic appearances. Other possible causative conditions of irritable bladder, already considered, should first be taken into account and excluded. The previous history of punctate ulcer is that of long duration, persistence in spite of treatment and gradually increasing severity. The symptoms are frequent desire to urinate, painful urination, pain in the bladder with reflex pain in the perineum and rectum, often with spasm of the sphincter and perineal muscle. The urinalysis findings are very generally negative except as to the presence of occult blood, which may be intermittent in its presence. I have found Hunner's description of the cystoscopic appearance so accurate and so helpful that I give it. He states that:

"On cystoscopy one's attention is not infrequently first arrested by a glazed dead-white appearance of a portion of the bladder mucosa. In such an infiltrated area the vessels may have a broken or 'choppy' appearance, only short segments of vessels appearing in the extra pale surface. One may see a dead-white scar area, with a small congested area, in the immediate neighborhood; and while one is examining this area, or, after one has touched it, the congestion becomes marked and may even begin to ooze blood. Sometimes an area of edema appears, the mucosa taking on a deep red congested appearance and being raised above the general mucous level. This area of edema may occur immediately about the ulcer area or it may appear on a portion of the wall at some distance from the ulcer. It may be absent at several consecutive examinations and then appear at a subsequent examination. It is particularly likely to be seen if the patient is in the midst of an unusually bad period of bladder symptoms with strangury."

In certain of these cases I have observed a slight granular appearance suggestive of primary tuberculosis, but which, in the light of Hunner's researches, we now know to be due to the development of minute cysts with mucous lining.

Causes of Punctate Ulcer. The cause of punctate ulcer has not been reduced to a demonstration. In his earlier cases Hunner ventured no conjecture. This was justified in view of the fact that the condition obtained without an antecedent history of bladder infection, either gonorrheal or mixed, with no child-bearing and no evidence of primary tuberculosis. A little later he became impressed with a possible etiology in focal infection. This was fortified by the frequent coincident occurrence of punctate ulcer with rheumatic and arthritic conditions and by the demonstrated connection of pyorrhea and tonsillar infection with a number of his cases as in one of the three which I present. This phase of the subject can only be developed by longer observation with a careful collation of facts.

Pathology of Punctate Ulcer. The pathology of this condition, so far as it has been developed, seems to be that of a chronic interstitial cystitis involving, to a greater or lesser degree, all the layers of the bladder wall. The involved area seems to become chronically and statistically edematous. In certain very limited areas this interstitial process encroaches upon the epithelium, and by cutting off the capillary supply, causes macular necroses. The areas thus deprived of their epithelium are generally round and from 2 to 3 mm. in diameter. In some instances they are slightly elongated. These minute ulcers seem smaller through the cystoscope than they do after removal. A large number of these ulcers from over a considerable area, generally on the anterior wall and the vertex, may be from 2 to 6 cm. or more in length and from 1 to 4 cm. or more in breadth. They are sometimes associated with minute cysts of follicular origin. The underlying deep layer of the mucosa is the seat of a true hypertrophy which, by virtue of its perma-

nent character and its influence on the nutrient supply to the epithelium, is a determining factor in the incurability of the ulcers, which show no effective tendency to reparative process.

Operative Treatment. The clinical history of these cases, the absence of all tendency to spontaneous recovery and the failure of all so-called conservative methods of treatment, interpreted in the light of the pathology of the condition and in the light of demonstrated recovery following operation, all point to excision of the ulcer-bearing area as the only rational method of curative treatment. The procedure devised for this purpose, while bold and radical, has the merit of being rational and the added virtue of being successful. The original procedure as devised by Hunner, the extraperitoneal method, as I understand it, was exemplified in principle, with only slight variations in detail, by the various steps employed in my first case as follows: The bladder was filled to distention with a 0.5 per cent. solution of soluble iodin. (Bohlander.) The patient was put in the Trendelenburg posture. A Pfannenstiel incision was used to approach the bladder, which was easily reached. The connective tissue, however, did not yield readily in the effort to separate the bladder, especially from the peritoneum covering the anterior wall. The peritoneum was, however, pressed well down from the posterior surface, after which the edematous area, *i. e.*, the ulcer-bearing area, could be readily outlined by palpation. Considerable hemorrhage was experienced in this stage of the operation. The bladder was now collapsed by catheterization, and an ellipse of the bladder wall about 6 cm. in length and 3½ cm. in width was freely exsected. The cut edges of the bladder wall were stretched together by means of fine chromicized catgut, care being taken that there should be no overlapping in the approximation. The peritoneum now came readily over the now resected bladder and the incision was closed in the usual way, but with a cigarette drain. A mushroom catheter was

left in the bladder. The drainage was discontinued in forty-eight hours. The bladder was washed out once daily by gently throwing into it an ounce of a 0.5 per cent. iodized water. The urethral drainage was kept up for fourteen days, the last four of which could probably be set down to excess of caution.

The second method, the transperitoneal procedure, was employed in my second and third cases. This differed from the preceding only in the following particulars: (*a*) The abdomen was opened in the median line from near the pubes to the umbilicus; (*b*) a vertical incision was made through the cystic peritoneum, beginning on the posterior curvature of the fundus and extending forward and down in front as far as the estimated extent of the ulcer-bearing area; (*c*) the peritoneum was then peeled back laterally until the fundus could be buttoned out through the slit; (*d*) the distended bladder was then collapsed by catheterization and the edematous area excised, after which (*e*) the bladder wall was closed and, over this closure, (*f*) the peritoneum was stitched together. In neither of these two cases was there enough oozing to justify drainage, but if drainage were required it could be done safely with either a transperitoneal cigarette drain or by a similar drain arranged extraperitoneally and brought out through the lower angle of the incision.

Conclusions. 1. The punctate ulcer of the bladder with its associated pathology is a demonstrated clinical entity.

2. The condition, by virtue of the pathology, is not only chronic but incurable by so-called conservative methods.

3. The usual limitation of the ulcerative process to the anterior wall and vertex of the bladder makes it surgically accessible.

4. The treatment by excision of the ulcer-bearing area is justified by its demonstrated practicability and by its equally demonstrated results.

DISCUSSION

Dr. Guy Le Roy Hunner, Baltimore, Md.—I should like to say a word of congratulation to Dr. Reed on bringing up this subject. I do not think it can be brought before the Association too often as long as women are going about having failure of diagnoses, as we know they are doing at the present time.

I am glad that we are able to get further and further away from these indefinite terms, such as irritable bladder, neurosis of the bladder, neurasthenia of the bladder and so on and give a definite classification to some of these cases in which there are actual disease conditions.

I think it is important to remember the conditions in the urethra that may cause the symptoms of irritable bladder. I presented a paper at the Louisville meeting of this Association, in 1910, in which I called attention to cases of chronic urethritis due to chronic tonsillitis. I have had many opportunities since to find that those observations were correct and that many of our cases of "irritable bladder" will be cured by finding the focus of infection usually in the tonsils, teeth, or sinuses and doing away with it. Cases that have had such severe symptoms as wetting the bed, and complete diurnal incontinence of urine, have received very little help by the usual methods of treatment of urethritis, but they were absolutely made well by the removal of the tonsils without any further bladder or urethral treatment.

I am going to show Dr. Reed a specimen I removed last Wednesday. This woman was the sister of a doctor in Chicago, so that she was rather fortunate in having the choice of good men to go to. She had been seen by Murphy and by many urologists in Chicago, she had been to the Mayos, and finally came to the dean of urological work here, Dr. Kelly, who sent me a note asking if I could solve the difficulty. I simply speak of this case to show that these women are still travelling about, and even where they have access to the best of men their disease continues.

You can see the ulcer in the center of this specimen; it gives you no idea of what you see through the cystoscope, as Dr. Reed has said. In this case, the first time I examined her there was no ulcer that I could see. The next time she came to the examining room the nurse had failed to bring the bedpan on time, the bladder had overdistended and she had some bleeding for the first time, and on cystoscopic examination an ulcer the size of a pin-head or a little larger was seen. This ulcer appeared

at operation because of the trauma to the bladder while freeing the perivesical adhesions before making the incision. This gelatinous-appearing condition of the mucosa or edema marked the extent of the diseased area.

Dr. Bransford Lewis, St. Louis, Mo.—I have not seen these ulcers as plainly as my friend Dr. Hunner, nor have I been converted as to their frequency. I do not deny their existence, but I wish to say one thing in regard to the very interesting and valuable paper of Dr. Reed. My own personal impression is that he has omitted to accentuate one source of trouble that to my mind is very frequent and very important, namely, the cause of irritable bladder, prolonged indefinitely, say from five to twenty-five years, comes from the urethra itself and not from the bladder. It is either due to a urethral contracture that is spasmodic or organic in character; it is definitely demonstrable, and is relievable by the application of treatment confined to the urethra. This is confirmed by examinations and the demonstration repeatedly of retained urine. The urine may be limpid, clear and absolutely free from infection or it may contain numerous colon bacilli. It may be overlooked for years. It may exist in young girls or in women up to thirty-five years of age. These patients can be relieved with a Kohlmann dilator or other measures applied to the urethra to overcome the contracture.

Dr. Reed (closing).—In answer to the remarks by Dr. Hunner I will say that in a portion of the paper which was omitted I brought out the relationship of conditions within the urethra to this particular symptom, and it will appear in the printed article.

A thing which has been largely overlooked in the urethra is the frequent involvement of Skene's follicles. Dr. Alexander J. C. Skene drew our attention to that condition thirty years ago, and it has been the means of enabling me to relieve many of these cases by simple intervention—by simple incision of the follicular septum and cauterization—and it is rather important. But, looking back over a much longer period than was embraced in the cases which I hunted up and that came back for relief, I am sure that there were many more cases of this condition of punctate ulcer. It ought now to be looked for with very much more care and with much more directness than before. We are having our attention directed to it by reports of indisputable value, and we should be on the lookout more and more for it in the future.

TRANSPLANTATION OF THE APPENDIX TO SUPPLY AN ABSENT URETHRA

By Charles M. Rosser, M.D.
Dallas, Tex.

The vermiform appendix has had medical and surgical consideration for disorders consequent to its pathological changes for many years, but few attempts have been made for its utilization and fewer in which practical benefit have been derived. The case I am to report does not, of course, answer seriously the question often proposed by the laity, "What is the appendix for," but it is of somewhat unique significance that it may be successfully transplanted for a practical purpose.

In October, 1918, Mrs. A. presented herself in my clinic at the Baptist Sanitarium with the following pertinent history: Widow, aged forty-eight years; no important clinical conditions except that for what she was told was a malignant tumor of the urethra, that organ had been removed at the bladder juncture five years previously. Since that time the bladder was both minus a delivery tube and the power of urinary control.

The operation planned and executed consisted of an incision through the mucosa, one below the clitoris, and the other at the bladder exit between which a tunnel behind the anterior vaginal vault was made with suitable forceps. The bladder mucosa was dissected from the neck of the bladder for the distance of about three-fourths of an inch. Splitting

the mucous membrane over the neck of the bladder, longitudinally uncovered the remaining portion of its sphincter so that it could be shortened. These preparatory steps taken, the patient's normal appendix was quickly removed together with its meso, placed in warm saline emersed in which the tip was cut off its lumen, sterilized by injection of 50 per cent. alcohol, and a small-sized catheter passed. The meso-appendix was then clipped and several linear incisions made through the peritoneal coat. So prepared, the catheter with the transplant was inserted through the tunnel described well into the bladder, the distal end of the appendix entering the freshened bladder neck about one-half inch where it was sutured as was the tunnel and bladder with fine catgut. The proximal end projected fortunately half an inch out of the upper end of the tunnel. This made a meatus possible by splitting and sewing the flaps back on either side to denuded surfaces.

For four days the catheter was allowed to remain, the only treatment being daily irrigations with warm boric solution. A protecting silk stitch was then cut, the catheter then withdrawn, and the bladder irrigated through the new urethra. The catheter was then replaced for a few days after which its use was discontinued.

The patient left the hospital in ten days but was under constant observation for several weeks during which time the bladder behavior was normal, control being perfect; the capacity which had been greatly lessened by the five years of incontinence gradually expanded and the transplanted appendix accustomed itself to its new surroundings furnishing what appears to be a permanent canal. The major difficulty as one may apprehend was to think of the application since the surgical principles involved had been worked out and established by others in different operative fields; but the surgical literature at my command makes no mention of this particular procedure.

DISCUSSION

Dr. I. S. Stone, Washington, D. C.—Dr. Rosser has given us a very useful suggestion. I have not had experience enough to discuss the operation he performed on this case, but I thank him for the suggestion. His method of using part of another organ is interesting, and I am glad to know that the method has been successfully tried. I have had much trouble with some bladder cases, and especially with reference to forming a new urethra, and I will try this operation if I have another opportunity. I should like to ask Dr. Rosser how long it is since the operation was done.

Dr. Rosser.—It is now three months since the operation was done.

Dr. Guy Le Roy Hunner, Baltimore, Md.—I have been much interested in the case reported by Dr. Rosser and consider his contribution a valuable one. I do not know of anything that is more difficult to contend with than a case of complete loss of the urethra. Dr. Rosser was particularly fortunate in having a patient who had her sphincter of the urethra left. I had one case in which I had to remove the complete urethra because of a carcinoma of the external third of the urethra, and the operation took me back to the sphincter muscle. That patient, strange to say, held her urine nicely for eight days, and then, apparently under the influence of scar-tissue contraction, began to have incontinence, due to drag on her sphincter muscle. I waited some time, operated again and released the scar tissue about the urethra. Again, she had continence for some time after operation, but when the scar tissue began to exert its influence upon the urethra muscle there was leakage. This time it was thought wise to work with the electric current developing the size and strength of the urethral muscle. The perineum was untorn at that time. I heard from her only a few days ago; she still has satisfactory continence. She had only the sphincter muscle left. In these cases the urethral muscle can be developed by the judicious use of the electric current. It might be interesting for you to know about a case I recently dismissed from the hospital. She had a prolonged forceps delivery, with complete loss of the base of the bladder and of the urethra. She had had

two operations in an attempt to close the large defect in the base of the bladder. There was no evidence of any urethra at all. One of these operations had been an interposition operation, bringing the uterus forward to plug the base of the bladder. What the surgeon expected to do to help that patient I cannot imagine. If one plugs the bladder there should be some opening, and there was no sphincter to take care of the bladder function. She was really in a worse condition than if she had not had this interposition operation. In addition, she had three large fistulæ. One could introduce the index finger into any one of them—one back of the symphysis pubis on each side and one in the center. She was so sore and tender about the outside that she would not allow me to examine her without an anesthetic. I discovered the above conditions and told the family physician that the only way to relieve her would be to go inside, cut off both ureters and implant them into the bowel. The family physician went out of the operating room and consulted the husband, telling him that this was the only thing to do, and that it was taking a desperate chance, and the husband said, "Go ahead." I wanted to implant one ureter into the bowel at each of two operations, but the patient was in such desperation after two former operations that I decided to implant both ureters. Fortunately she came through nicely. About the third day after the operation she had some pain in the right kidney region, with a temperature of 101°, evidently due to a slight pyelitis. But the temperature gradually went down to normal and she had no more trouble up to the time she left the hospital. She passed clear urine, held it nine hours one night and for three or four hours in the daytime. The rectum had taken on a reservoir function perfectly well.

Dr. Stone.—How long ago was the operation done?

Dr. Hunner.—She went home about a week ago; I kept her about seven or eight weeks.

Dr. Rosser (closing).—I am grateful for the suggestions made by those who have kindly discussed the case report, and with your permission I want to read as a part of such discussion a note which my friend Dr. Robert T. Morris left for me when he was called to New York.

Dr. Morris says: "I never go to a medical society meeting

without picking up some suggestion that pays for the trip. Your contribution to urethral surgery opens up a great new vista. Immediately upon my return I shall apply your idea pragmatically in two cases of urethral caruncle and a case of scarred urethra (parturition case) in which plastic work has failed, provided that these patients still have their appendices. Heteroplastic grafting from other patients would probably not succeed so well because of the laws of lysis. The only appendix-grafting that I have done has been for two cases of lost oviducts. In one case the appendix was completely severed before grafting. In the other case the cecum was very mobile and I grafted the appendix to the uterine cornu, leaving the meso-appendix with its free blood supply. The procedure was of speculative value only, and neither patient has become pregnant. In both cases, after clipping off the distal part of the appendix, I flushed the lumen with antiseptic solution to clean out any colonic bacteria."

Some surgeons have, I believe, transplanted the appendix to remedy fistula of the ureter, I do not know with what success. I am hoping that the pioneer work of Dr. Morris for the restoration of crippled tubes can be perfected, for surely no more urgent necessity than for us to find a way to reëstablish fecundity in women made sterile by infections, especially of the Neisserian variety. I am thinking that troublesome cases of epispadias might be corrected by the transplantation of the appendix, and I hope to have opportunity to try it in such a case.

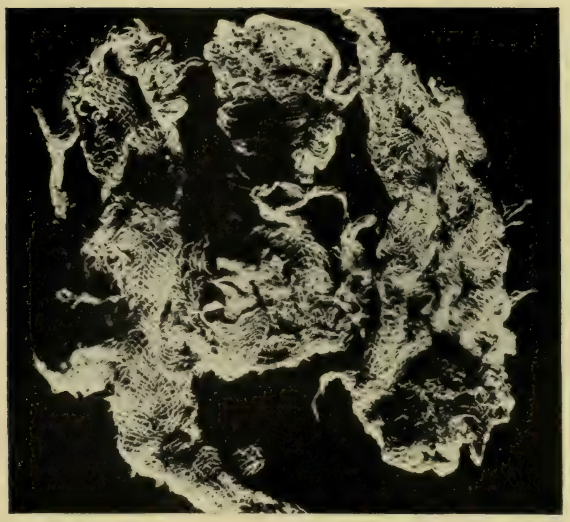
A GAUZE SPONGE SPONTANEOUSLY EXPELLED FROM THE URINARY BLADDER

By G. Paul La Roque, M.D.
Richmond, Va.

The academic interest of a single case is incident usually to the great rarity of such a case or to certain unique features presented by the clinical course or the pathological specimen. The instruction gained from the study of single or isolated cases of great rarity is usually obtained at the end rather than the beginning of the clinical course of the situation, and is hindsight rather than foresight knowledge. The practical diagnostic and therapeutic problems incident to unique or unusual cases of local disease are usually to be solved through a study of the signs presented in the organ or region involved.

The case herewith reported is interesting clinically from the standpoint of painful spasm of the bladder, pus in the urine and a palpable mass in the right side of the pelvis; academically because of its rarity and practically interesting from several standpoints.

In April, 1918, Dr. W., of North Carolina, brought to the Memorial Hospital a widow, aged thirty-four years, complaining of violent pain, of the vesical tenesmus type, in the middle and both sides of the lower abdomen, radiating to both lumbar regions and accompanied by the discharge from the bladder every few minutes to an hour of foul-smelling pus and blood mixed with urine. This woman had been perfectly well since childhood except for dysmenorrhea and some other pelvic symptoms for which she had been



A gauze sponge two inches wide by 10 inches long was spontaneously expelled from the urinary bladder.

operated upon five years ago by a doctor, with some experience in surgery, in a North Carolina city. She says that her left ovary was removed on account of a cyst, the uterus suspended and the appendix removed. The wound was completely closed, no drainage was necessary. The operation was successful in relieving her preëxisting menstrual symptoms and she remained in perfect health until the beginning of the present trouble. She lived the normal life of a well-to-do woman, fond of automobile driving and other outdoor sports. Her menses have been regular, painless and otherwise normal; she has not had leucorrhea, nor irritability of the bladder, nor indigestion, nor any symptoms of any kind. She has never been pregnant.

Ten days before admission, quite suddenly and without apparent cause, she was seized with a frequent desire to urinate; considerable pain before, during and after urination; constant pain in the lower abdomen; foul urine containing considerable sediment passed a little at a time at intervals of a few minutes to one hour, night and day. She sought relief immediately, and Dr. W., after applying the usual remedies without improvement, brought her on for examination and treatment.

On account of the great pain, frequency of urination and the foul odor of urine, she came in the drawing room of the car to avoid embarrassment to herself and disturbance of other passengers. During the night two large doses of morphine and hyoscine had to be administered on account of tenesmus. Upon admission to the hospital the pain was agonizing and the foul odor and frequency of urination were equally embarrassing to her refined and modest temperament. In spite of her fortitude she exhibited a distressing appearance. Her temperature was normal and pulse 90. A thorough examination of her entire body revealed no evidence of disease except in the pelvis and a slight amount of tenderness in the right lumbar region. The latter, however, was quite trivial.

Vaginal examination showed tenderness most marked in the region of the bladder. The uterus was in normal position and freely movable. In the right vaginal fornix a distinct mass was palpable and quite tender. Examination of a catheterized specimen of urine showed it to be three-quarters pus. Instead of calling the case one of pus in the urine it was more properly called one of urine in pus. Foul odor is inadequate for its description; the odor was that of rotten eggs. Examination of a filtered specimen showed it to be acid in reaction, contained an abundance of albumin, pus and blood, but no casts nor other renal elements. The urine-pus was dribbling away constantly, could not be retained, and every half-hour or so, coincident with a spasm of the bladder, she would expel sometimes as much as three or four ounces. An *x*-ray examination made the next day showed slight enlargement of the right kidney, normal left kidney and a vague diffuse shadow in the lower abdomen. No stone was present in any part of the urinary tract and there was nothing characteristic about the shadow in the pelvis of the abdomen. Dr. A. L. Gray, the roentgenologist, was quite satisfied when he saw a specimen of the pus containing urine that this in the bladder could easily account for the shadow. Her temperature the next day was 101°, pulse 100. There was at no time any evidence of kidney colic or kidney tenderness.

At this point we were quite puzzled. The mass felt in the right vaginal fornix, of course, felt quite like an enlarged ovary or tube. We frequently see pus in urine in cases of inflammation of a tube and ovary, though I have never seen such pus-containing urine as this caused by such pathology. Moreover, she had no vaginal discharge or menstrual symptoms indicative of disease of the uterus, tubes or ovaries. I tried for two or three days to urge myself into making a cystoscopic examination, but the agonizing pain which the woman suffered at all times, and especially whenever her bladder contained as much as two or three ounces, caused

me to believe it could not have been made without a general anesthetic, and I continued to postpone it from day to day. With the usual drugs directed to the relief of vesical tenesmus no relief was obtained, and even with morphin sometimes combined with atropin and with hyoscin, there was no relief for more than two hours. Several vaginal examinations revealed the same mass in the right fornix. We were puzzled as to whether to do a vaginal cystotomy or operate upon the abdomen, and temporized from day to day. Four days after she came to the hospital she suffered retention of urine, and an unsuccessful attempt was made by the nurse to catheterize her. I noticed in using the soft-rubber catheter myself that it had to be introduced about three inches before urine came. I withdrew a quart of foul pus containing urine. She continued to suffer the same tenesmus, passing the same kind of urine. At no time was her temperature above 101° and her pulse ranged from 80 to 110. Five days later she again had retention, and an unsuccessful attempt was made by a nurse to catheterize her. Upon inspection of the meatus I noted a white substance, close examination of which revealed a piece of gauze in the urethra. Twisting this into a rope with my fingers the gauze rag two inches wide and ten inches long (here exhibited) was removed. Within twelve hours her symptoms were distinctly improved and from day to day the improvement was rapid, and in six days she was apparently well; had no urinary symptoms of any kind, the urine was clear and a microscopic examination showed only a small quantity of pus. She was walking about and enjoying life as usual. In the meantime a perfectly normal menstrual period had appeared, which lasted four days and then ceased. Five days after removing the sponge a cystoscopic examination, painlessly made, showed no evidence of any foreign material in the bladder and no cystitis. The only evidence that the bladder had ever been diseased was shown by a small area to the left of the right ureteral orifice, which looked like an almost healed fistula.

No mass or other evidence of disease could be detected by vaginal examination. One week after the gauze was removed, and three weeks after coming to the hospital she returned to her home a perfectly well woman. She has remained well ever since and is living her normal life.

SUMMARY. 1. A clean small gauze sponge was left in a clean pelvis.

2. No symptoms of any kind resulted during an after-period of five years.

3. A sudden apparently causeless onset of bladder tenesmus and suppuration was followed in three weeks by spontaneous expulsion of the sponge to the meatus, and easy delivery was accomplished by traction with the fingers.

4. Instant relief of tenesmus and rapid and complete subsidence of all symptoms followed, and in a week spontaneous closure of the fistula, through which the gauze had ulcerated into the bladder, had occurred.

DISCUSSION

DR. THOMAS S. CULLEN, Baltimore, Md.—I wish to relate a case that came under my observation, one that has some bearing on gauze being left in the abdomen or in the neighborhood of the bladder. Some years ago I had a small myomatous uterus in which there were numerous nodules scattered throughout the organ. The patient was a woman nearing the menopause. As there were some adhesions posterior to the uterus I thought it wise to leave the organ and merely drain the cul-de-sac. I cautioned my assistant, who was instructed to introduce a pair of Kelly forceps into the vagina, so I might cut down upon them from above, to be sure his forceps were in the vagina. The tip of the forceps did not point upward just behind the cervix, as usual, so I said, "Are you sure you are in the vagina?" He replied "Yes, absolutely." I then cut down upon the tip of the forceps and he grasped the two drains and drew them down in the vagina. I made my rounds while the assistant was closing

the abdomen. When he had put on the abdominal dressing and was preparing to send the patient to her room he was amazed to see that the drains emerged from the urethra. He had introduced the Kelly forceps into the bladder, carried it down through the left broad ligament and then out behind the cervix. I opened the abdomen at once, cut off the gauze flush with the pelvic floor and did a complete hysterectomy. Not knowing what injury had been done I isolated the ureters. There were two on the left side and one on the right. They had not been injured. After completing the hysterectomy I closed the hole in the bladder. The patient made a most satisfactory recovery.

A good many years ago a friend of mine was operating on a kidney case that I saw with him. He had put in a sponge. Later I said to him, "I do not think you have taken that sponge out." He replied, "Yes, I have." In the course of two weeks green fuzzy particles were seen coming through at the site of the incision. The patient was given an anesthetic, and the sponge which had become macerated was removed. On another occasion a colored doctor brought a patient to the hospital to be operated on. In this case two large pieces of gauze, which lay directly under the omentum, were removed. I do not remember what her symptoms were other than that she had had an attack of acute abdominal pain. Some years ago I reported an unusual case of extra-uterine pregnancy. The contents of the sac had become infected. In this case there was a continuous discharge of pus from the bladder. After walling off the sac which lay in the right iliac fossa I found an old abscess sac filled with fetal bones. The end of one of the long bones projected into the bladder and the ends of two others had burrowed through into the cecum. The one that projected into the bladder was covered with phosphates.

A Southern friend of mine had a case in which an operation had been previously done by another surgeon for appendicitis, but following the operation there was a continuous discharge. This case was seen in the country. The relatives were all in the room. My friend made an incision and found that the previous operator had left a good-sized piece of gauze behind. He packed in twelve pieces of gauze and pulled out thirteen and nobody was the wiser, not even the assistant. In a case I saw a few months ago with an assistant, who had operated and done a hysterectomy for myoma, the patient did not do very well; she developed pleurisy and a short time later came back to the

hospital for relief. I saw her and I said to the assistant, "What do you think is the matter?" He replied, "I do not know." There was a lump in the left side which was caused by a piece of gauze. The gauze formed an abscess which opened into the rectum. The gauze was removed from above and the woman finally made a good recovery.

Dr. Winslow—What made you think it was gauze?

Dr. Cullen.—It was an irregular, thickened mass. Her symptoms started after operation and localized in the quadrant of the abdomen where there was nothing before. I could think of nothing else than a piece of gauze on account of the irregularity and the thickened contour. The interval between the time of the operation and the time I saw her was so short that one could rule out malignancy with certainty.

Dr. W. P. Carr, Washington, D. C.—I operated on a very large fat woman for an ovarian cyst at the hospital ten months ago. She made a good recovery and went home in excellent condition, but she had not been home very long before she commenced vomiting and had gastric symptoms. I called in Dr. Clark, of Washington, who treated her for about four months for achylia gastrica. One day I went to see her and the nurse came to me with a small gauze sponge, or cotton covered with gauze, wrapped up carefully and said the lady had passed this from the rectum. She immediately recovered and she had no further local symptoms. Her symptoms were more of the stomach than of the intestine. I do not know how the sponge got in there, but it must have been put in there by one of my assistants.

Dr. Henry O. Marcy, Boston, Mass.—The expulsion of foreign bodies through the urinary tract from the peritoneal cavity is surely rare. I report this case because it is the only one I have ever known. An account of it was published some years ago. A doctor took his wife to a celebrated surgeon of New York City, a good friend of mine, who operated upon her, removing a uterine fibroid. Some weeks later she was brought to me and she presented the most distressing case of tenesmus I have ever seen. Large doses of morphin, even four and five grains a day, were necessary for a considerable period to afford

relief. The woman was in agony. We dilated the urethra and removed three stones that I supposed originated in the usual way. However, carrying my finger farther, there was a stone that was tied to the fundus of the bladder. With some difficulty I succeeded in removing it, and on cleaning it we found a double loop of a large suture of silk tied to the broad ligament which had found its way into the bladder. This had eliminated itself through the opening, although still adherent. The other calculi had a suture as a nucleus. Within a few days the woman was comfortable and a rapid convalescence followed.

ANURIA AFTER UNILATERAL NEPHRECTOMY

By Louis Frank, M.D.
Louisville, Ky.

At the 1914 meeting of the Southern Surgical and Gynecological Society at Asheville, N. C., I reported five cases of anuria due to unilateral calculous obstruction and discussed the subject from several viewpoints. In this paper I desire to record an additional case of anuria with an entirely different causative factor and which terminated fatally.

Miss E. T. came under observation in 1912, and again in June, 1915. The family history was negative for carcinoma, tumor, tuberculosis, insanity, etc. Father and mother living and in good health, as are two brothers.

Previous History. At five years of age she had tuberculosis of the right hip, which, treated by Dr. V. P. Gibney, of New York, resulted in ankylosis of the hip and shortening of the right leg. At the age of seventeen a psoas abscess developed, from which she made a recovery. Later labial abscesses were present. Menstruation was always very painful, and for this the cervix had been dilated and a curettement done. Since childhood the patient has had pain over the appendiceal region, and at one time was sent to the hospital for operation, which, however, was not done. This pain has since been attributed to hypertrophy of the abdominal muscles.

For the past two years she has complained of extreme nervousness and has had attacks of hysteria. There have

been numerous attacks of urinary retention requiring catheterization, large amounts of urine, however, being always found in the bladder. The bladder has been irrigated upon numerous occasions during the past two years, and, following cystoscopic and radiographic examination, the right kidney pelvis was repeatedly washed with collargol solution. The appetite has been very poor, and she has in two years lost forty-six pounds.

Physical Examination. Heart, lungs, liver and stomach normal. Abdomen soft; no masses felt, nor is there tenderness anywhere. Right hip ankylosed, the right leg much atrophied and three inches shorter than the left. Temperature 99.3° F., pulse 100, respiration 20.

Urinalysis: amber color, specific gravity 1004, acid reaction, albumin positive. There is a large amount of pus, no leukocytes, red blood cells nor casts; few squamous epithelia.

Radiographic Examination. Lungs and heart normal. Right kidney displaced downward; no renal calculi or other shadows. Pyelographic; right kidney displaced, low-lying; pelvis opposite fourth lumbar vertebra. Ureter normal in shape and position. Left kidney normal in position; ureter normal in shape and position.

Cystoscopic Examination. Bladder wall normal except in trigonal area. Here and at neck the vessels are enlarged and tortuous; trigone much reddened. Right ureteral orifice slightly distorted, swollen, some small punctate hemorrhages about it. Left orifice normal.

Indigo-carmine intramuscularly excreted from both kidneys about the same time, *i. e.*, about eight minutes. Phenolsulphonephthalein test: First hour 35 per cent., second hour 18 per cent. Left kidney urine, occasional pus cell only; right kidney urine, large amount of pus. No tubercle bacilli found microscopically in urine from either kidney or in combined urines as obtained from the bladder which contains numerous organisms.

Guinea-pig inoculation: At the end of three weeks animal inoculated with centrifugalized urine from right kidney is much emaciated and autopsy shows gross lesions of tuberculosis involving spleen, liver and lymph nodes in omentum in region of stomach. Smears made from these lesions showed a beaded acid-fast organism. Control pigs and one inoculated with urine from left kidney show no lesions suspicious even of tuberculosis. Diagnosis: Right renal tuberculosis.

Operation (July 1, 1915). Nephrectomy, right kidney, under nitrous oxide gas-oxygen anesthesia. Examination of kidney removed reveals "in the substance of the kidney a few miliary translucent nodules. There is present also a rather large caseous mass about 1 cm. in diameter near the pelvis. The ureter is distinctly thickened and involving the pelvis the lesion is uniformly distributed. Microscopically numerous typical miliary tubercles with giant-cell formation and epithelioid cells. There is also marked round-cell infiltration. Microscopical diagnosis: Tuberculosis of kidney" (Baldauf).

The patient's temperature the night before was 100° F. pulse 102, morning before 99.2° F., pulse 108. She was returned from the operating room at 10 A.M. and given morphin sulphate $\frac{1}{8}$ grain. At my evening visit at 6 P.M, temperature 100° F., pulse 118, and the chart showed only 2 ounces of urine containing blood. She was immediately catheterized and 4 ounces of clear urine obtained. Saline protoclysis was ordered. Twenty-four hours after the operation there had been no further excretion of urine, though twelve hours later 1 ounce of bloody urine was obtained.

Kidney decapsulation was advised but refused. The usual remedies were given: the loin cupped, etc. A catheter was introduced into the left kidney pelvis and warm saline lavage instituted. This resulted in the secretion of a few ounces of bloody urine, but with this one exception no further urinary secretion occurred until the

nineteenth day, when 1½ ounces were voided. On July 20 several drams were obtained by catheter.

Refusing repeatedly and constantly any further operative measures, with full knowledge of the otherwise certain termination, the patient lived for twenty-six days, dying quietly without pain, conscious to within a very short time of her demise.

In reviewing the bedside history of this case there are several interesting points to which I would briefly like to call attention. This patient has been having elevation of temperture for certainly a considerable period before entering the hospital, which elevation was maintained postoperative for three days. The temperature on admission and for several days before the operation was 101° F. The day following the operation the morning temperature was 99.2° F., evening temperature 100.2° F. On the second day the highest temperature was at noon 99.4° F. On the third day the temperature receded to normal and remained so throughout the entire course until just before death of the patient, when it registered 102° F., axillary. The previous day the temperature had been normal. A small drain had been placed in one angle of the incision; this was removed on the fourth day, the wound healing primarily; and at the time of the patient's death no dressings had been worn for several days.

A study of the pulse and respirations might also be of some interest. The pulse following the operation was 110, rising to 120 that evening and remaining about the same for twelve hours. On the second day the pulse receded to 104; the third day it was from 76 to 88, and remained about the same until the sixth day, when it varied from 80 to 100. This range was maintained with some slight variations until six days before the patient's death, at which time it began to gradually rise, the highest point reached at any time being 130, but never under 100. The volume, which was good at first, became very much less a few days before death.

The blood-pressure was 112 mm. Hg. at the time of operation. On the fifth day it was 100, the seventh day 105, the ninth day 119. It did not vary markedly from this, the reading ranging from 116 to 120 until within the last few hours, when it gradually became lower.

The most marked effect of cessation of the urinary secretion seemed to be upon the respirations, which were reduced within forty-eight hours to 16, then to 14, remaining 12 to 14 to 16, both waking and sleeping, until the nineteenth day, when they were read as 8; on the twentieth day as 6; varying between 6 and 8 during the remainder of the patient's life until twenty-four hours before death, when they reached 18, remaining between this and 24 to 26 to the end.

A study of the blood urea was impossible on account of the opposition of the patient and her family to making repeated records. However, seven days after the operation there were 18 parts of urea in 10,000, an estimate of 83 mg. of urea nitrogen per 100 c.c. of blood. Twelve days later this had risen to 172 mg. of urea nitrogen per 100 c.c.; and about four days later this was increased to 200 c.c. No further blood was had for the reasons stated. It would have been interesting to have kept an accurate record of this condition.

The bedside chart reads that there was no nausea immediately following the operation, but the patient began vomiting eight hours after she was placed in bed, and without any cessation this vomiting was continued four or five times daily until her exit. The vomitus consisted of bile-stained fluid at first; later it began to contain some undigested food particles; and the day before death it became brown in color, contained blood, and had a very offensive odor.

Alvine evacuations occurred every day, and were at times very thin and offensive, probably due in part to the administration of purgatives in an effort to maintain elimination through the intestinal tract. For several days, from

about the fifteenth until the twentieth day after operation, considerable blood was passed by the rectum and a great deal of mucus. During this time no purgatives were given. The patient was able to take nourishment constantly; there was never the slightest mental disturbance, her mind being perfectly clear until within twenty-four hours of death. She slept well every night, had her daily bath; there was no twitching, no headache, no visual disturbance; in fact, she seemed normal in every way so far as her appearance was concerned from ordinary physical observation.

On the twenty-second and twenty-third days she hiccoughed quite frequently during her waking hours. She was out of bed daily for variable periods of time, being up in a roller chair and at times walking about the room from the twelfth day until twenty-four hours before her death. The patient, of course, necessarily was much perturbed on account of her inability to pass urine, and would become very much excited and nervous and at times would talk of it constantly, so that it was difficult to get her to sleep Because of this she was given occasional doses of morphin or veronal at bedtime. There were never any convulsions or any evidence other than that found by blood examination of urea retention.

In reporting this case in such detail we do so with the idea of eliciting some discussion, particularly as to the cause of this occasional sequel of nephrectomy. Numerous cases have been reported in the literature where suppression varied from a day or two to as much as eight or ten days; and if I mistake not Morris cites a case of thirty days' duration.

It might be that this case should not be classed as one of complete anuria, as a little urine was voided upon several occasions during the patient's illness. The tolerant stage, however, in this case resembles in its duration that which we have with calculous anuria, though some of the symptoms which we have observed in calculous anuria were not present in this individual.

We are still of the opinion that not only in calculous anuria, but in the occasional suppression which follows nephrectomy, the suppression is brought about entirely through circulatory disturbances. We think that the term reflex anuria indicative of some nerve connection or nervous reflex is a misnomer. Our studies some years ago in ureter ligation showed a compensatory vascular activity in the kidney with the open ureter. In every instance the afferent vessels became overfilled with blood. The efferents can only contain a certain amount of blood, and we have happening here just exactly what happens in a stampede of a crowd at a theatre fire. A few get out, but the large mass (the blood on the afferent side) is held back.

We believe it is this active arterial congestion, this vascular overfilling, particularly on the arterial side, which accounts for the diminution in the urinary output in practically all cases of unilateral nephrectomy during the first few hours. As soon as the circulation on both sides becomes equalized the kidney gradually accommodates itself to performing the function of both organs.

We would again offer circulatory disturbances as the explanation of anuria not only in this case but in those due to unilateral calculous obstruction.

THE TREATMENT OF THE UNDESCENDED OR MALDESCENDED TESTIS, WITH PARTICULAR REFERENCE TO END-RESULTS

A Report of 415 Cases

By William B. Coley, M.D.
New York City.

In the Out-patient Department of the Hospital for Ruptured and Crippled, from 1890 to 1918, there have been observed 80,736 cases of inguinal hernia in the male, of which 1357 or 1.68 per cent. were associated with undescended or mal-descended testis. From 1890 to 1918, 4453 cases of inguinal hernia in the male have been operated upon, of which number 334 or 7.5 per cent. were associated with undescended testis. Of 1040 cases of inguinal hernia in male adults operated upon at the Memorial Hospital by Dr. William A. Downes and the writer, 49, or 4.71 per cent., were associated with undescended testis. In a paper read before the New York Surgical Society on April 22, 1908, I reported 126 cases of undescended testis which I personally operated upon, and which had been traced as far as possible to end-results.

While a number of articles have been written upon the subject since that date, there is still more or less doubt in the mind of the medical profession as to the indications for surgical treatment and still a wide difference of opinion as to the best method of operation. Even at the present time no large statistics exist in which the end-results of operative

treatment have been given, and the present paper has been written chiefly with the hope that some further light may be thrown upon the question as to the condition of patients with undescended testis many years after operation.

In my earlier paper I dwelt with considerable detail upon the various theories as to the causative factors connected with the development of the undescended or mal-descended testis, and described the various types of undescended or maldescended testis usually observed.

As regards the etiology of the condition, the theory that a mechanical obstruction of some sort, due to inflammatory adhesions formed during fetal life, is the principal cause, has been strongly advocated by Büdinger and has found many adherents. Büdinger operated upon 24 cases of undescended testis of the inguinal variety, and states that he found mechanical obstruction of some sort in 15 of these 24 cases.

As I stated in my former paper, Odiorne and Simmons, of Boston, have made an important contribution to our knowledge of the pathology of the undescended testis in their paper published in the *Annals of Surgery*, December, 1904. They found a marked tendency to thickening of the tunica albuginea in nearly all of the specimens examined and an increased amount of interlobular connective tissue.

More recently, Uffreduzzi, of Carle's Clinic in Turin,[1] has made perhaps the most exhaustive study of the pathology of the retained testicle, that has yet been published. His observations upon the etiology of the undescended testis are of special interest. He states that the explanations offered by many of the earlier writers are exceedingly *naïve*, in that these writers frequently confound the cause of the anomaly with its result. Kocher explained the incomplete descent of the testis as well as the atrophy of the gland by an inflammatory process during intra-uterine life, but was unable to support his hypothesis by objective findings. The theory

[1] Arch. f. klin. Chir., Bd. c, Heft 4, and Bd. ci, Heft 1.

that the non-descent of the testis is dependent upon mechanical obstruction due to peritoneal adhesions occurring during fetal life was originally advanced by Cloquet and Wrisberg, and later strongly advocated by Büdinger and supported, he believed, by numerous necroscopic and operative findings. Büdinger goes so far as to state that in his opinion mechanical obstruction caused by such adhesions accounts for retention of the testicle in 96 to 97 per cent. of the cases, and that the instances in which a congenital origin of retention is apparent will amount to not more than 2 or 3 per cent. Uffreduzzi disagrees entirely with Büdinger's conclusion, and in regard to the great frequency of such cicatrices, he states that no other investigator has found them in any such proportion as Büdinger. Lanz stated that he found no such cicatrices in any of his 51 cases, nor did Uffreduzzi himself observe a single such case.

My own observations based upon our experience at the Hospital for Ruptured and Crippled, and at other hospitals, are in accord with Uffreduzzi. I have found no evidence of old adhesions. Uffreduzzi lays far more stress upon the element of heredity as a cause of ectopia, a theory first advanced in the classical paper of Godard's. The latter states that the descent of the testicle as it takes place in man is nothing but a recapitulation of the phylogenetic migration as it gradually takes place in zoölogical evolution. Hence, some authors consider retention of the testicle a simple continuation of a condition that is normal in certain animals, and that a retained testicle must be looked upon as a sign of arrested development. I have personally operated upon a boy of thirteen years with double abdominal ectopia, who has a younger brother of twelve, also with abdominal ectopia.

Uffreduzzi states that in the great majority of cases of ectopic testicle there are other signs of degeneration. In 24 cases examined by himself, he invariably found a greater or less number of distinct anomalies, physical as well as mental. In one case bilateral cryptorchism was associated

with true hermaphroditism. This extremely rare form of hermaphroditism, of which only two other cases are recorded in the literature, represents one of the most serious forms of degeneracy known.

On basis of his investigations, Uffreduzzi concludes that retention of the testicle is hardly ever an isolated fact, but merely a local expression of infantilism, *i. e.*, of a serious retardation in the development of the entire individual, which may be more or less pronounced and is nearly always accompanied by other bodily or mental symptoms.

Uffreduzzi has made an exhaustive study of the literature with reference to developmental anomalies of this kind in idiots and mentions Bournville and Sollier's statistics, comprising 758 cases of idiots, which showed such anomalies as phimosis, hypospadias, atrophy, retention of the testicle, various malformations of the penis, in a considerable number of cases.

Knecht's statistics, covering 379 individuals belonging to this group, shows: phimosis 51 times; bilateral retention of testicle 11 times; atrophy of the testicle 18 times; episadius twice, hypospadias 5 times; varicocele 12 times. Uffreduzzi's own examinations made at Morro's Institute for Insane, covering 100 cases, show 47 simple epileptics; 7 epileptic idiots; 12 cretins; 14 phrenosthenics, etc. In 18 of these 100 cases he found an ectopic testicle (6 bilateral and 12 unilateral).

Personally I believe that Uffreduzzi goes somewhat too far in his claim that in the great majority of cases of ectopic testicle there are other signs of degeneration. I believe a study of the statistics will show that while these various types of abnormal mental development have associated with them a large proportion of undescended or maldescended testis, it does not necessarily follow that the reverse is not true. Such a statement as Uffreduzzi's should be based upon evidence obtained from a very large number of cases of undescended testis. Our own observations at the Hos-

pital for Ruptured and Crippled based upon 1357 cases of undescended testis show that marked signs of physical or mental abnormalities are only associated with double undescended testis, and in but a moderate proportion of these. As regards the unilateral undescended or maldescended testis we have found no evidence showing that this is usually or frequently associated with other abnormalities.

As regards the pathology of the undescended testis, owing to the fact that we have from the beginning strongly advocated attempting to save the undescended testicle and not to sacrifice it, we have now very little material for pathological investigation.

Uffreduzzi states the structure of the retained testicle varies greatly in the individual cases. The principal changes that are nearly always found are thickening of the tunica albuginea and of the basement membrane of the tubules and a great increase in interstitial cells. The epithelial lining of the tubules also shows very marked changes, the epithelial cells being few in number and more or less degenerated and irregular in shape. In a chapter on the pathology of the retained testicle Uffreduzzi discusses the various complications that are apt to accompany the condition of ectopic testicle and which, in order to differentiate them from the congenital complications, he designates as secondary or acquired. Among these are pain and nervous disturbances; specific or chronic inflammation; gangrene and incarceration of the testicle; torsion of the cord. (In a series of 80 cases of torsion of the cord collected by Uffreduzzi, a retained testicle was found in 60 per cent.) The most common complication of undescended testicle is hernia which, in rare cases, may be acquired. In all but two or three cases we have found a potential or actual hernia of congenital origin. Further complications are hydrocele of the cord and neoplasms. That the retained testicle frequently becomes the seat of tumors, was first claimed by Lecomte, in 1851, and has since been confirmed by many others.

In my former paper on the "Treatment of the Undescended or Mal-descended Testis,"[1] I stated that there was considerable difference of opinion in regard to the question of whether the undescended testis predisposes to malignant degeneration, and cited the various views pro and con. McAdam Eccles in his Jacksonian Prize Essay, 1903, stated that he had made an examination of 48,000 males with hernia at the London Truss Society, and found 2 per cent., or 854 cases, with undescended or mal-descended testis. Yet, in this entire series there was not a single case of sarcoma observed. He further stated that of 40 cases of sarcoma of the testis observed in one of the large London Hospitals during a period of twenty years, there was only one case of sarcoma of the undescended testis. From this fact he concludes that the generally accepted opinion that malignant disease is more common in the undescended than the normal testis, is not well founded. For many years I was inclined to agree with Eccles's opinion, but further observations convinced me that it was wrong.

In my paper upon "Cancer of the Testis," with a report of 64 cases, read before the Southern Surgical and Gynecological Association, December 15, 1914, I stated that in 12 cases the sarcoma or malignant disease was associated with an undescended testis, and discussed at considerable length the question of the relative frequency. Different writers give different opinions as to the relative frequency of cancer of the normally descended and mal-descended testes. Odiorne and Simmons in a review of 54 cases of malignant disease of the testicle observed at the Massachusetts General Hospital, found 6, or 11 per cent., in which the disease occurred in the undescended testis; of these 4 were in the abdominal cavity and 2 in the inguinal canal. Rademacher gives the proportion of malignant abdominal to malignant inguinal testicle as 1 to 8. Meiser found 64 malignant inguinal against 4

[1] Annals of Surgery, September, 1908.

abdominal testes. Bulkley, however, at the Presbyterian Hospital, found 2 cases of malignant abdominal to 12 cases of malignant inguinal testis. An analysis of the cases observed by Chevassu, Odiorne and Simmons and the Presbyterian Hospital records, show the proportion as 1 to 5. My own statistics show almost the same proportion, viz., 12 undescended testes in a total of 64 cases of sarcoma of the testis, or about 1 to 5½. Sarcoma of the testes shows a relative proportion of incidence of 1 in the undescended testis to 5½ or even 8 in the testis in the scrotum. We have only to show that the relative properties of undescended testis to normally placed testis is about 1 in 50 to prove that the abnormally placed testis is more prone to malignant disease than the normally.

With regard to the functional value of the undescended testicle there is still a wide difference of opinion, some writers going so far as to state that it has no functional value whatever, and for that reason advocates its removal. Uffreduzzi believes that a considerable number of undescended testes, 10 per cent., retain the power of reproduction. While the data at present is insufficient to enable one to express a positive opinion it is probable that Uffreduzzi's estimate is not far from correct. Aside from any functional value that the testis may possess there is another strong ground for preserving it, particularly in children, and that is for the reason that the interstitial cells, which are always present, have an important influence in developing the male characteristics of the child.

From January 1, 1890, to January 1, 1918, there have been operated upon at the Hospital for Ruptured and Crippled 334 cases of undescended testis, and since that time 31 additional cases. (Of these cases, 200 were operated upon by the writer personally, and the remainder by Dr. William T. Bull, Dr. John B. Walker, Dr. William A. Downes, Dr. Jos. P. Hoguet and the assistant surgeons.) Adding to these, 50 cases operated upon at the Memorial Hospital we have a

total of 415 cases of undescended testis. A most careful attempt has been made to trace these to final results.

In 49 cases the testis was found in the vicinity of the external ring just above the pubic bone; in 17 cases it was found in the upper scrotum; in 4 cases in the mid-scrotum, and in 16 cases it was impossible to locate it in any position. Probably it had retracted into the abdominal cavity or had become too atrophied for palpation).

Age, as far as known, of patients operated upon for undescended testis:

Under 5 years	33 cases
5 to 10 years	160 "
10 to 15 years	133 "
15 to 20 "	29 "
20 to 30 "	16 "
30 to 40 "	7 "
40 to 50 "	5 "
Over 50 "	1 "
	384 "

The different varieties of ectopia or mal-position of the testis are associated with slightly different types of sac, or variations in the size and location of the vaginal peritoneum. The most common type of ectopia is that in which the testis occupies a position in the inguinal canal, between the internal and the external ring. An interesting point in connection with this form of ectopia is that while the testis never goes beyond the external ring the tunica vaginalis may extend down beyond the external ring even beyond the bottom of the scrotum. In certain cases this pouch passes beneath the deep fascia and finds its way down into the perineum, and, in some still more rare cases, it passes down into the thigh.

The next most common type of ectopia is that known as inguino-superficial, in which the vaginal process passes out of the external ring, then turns directly backward and upward apparently with Poupart's liagment and extends 2 to 3

inches toward the anterior superior spine. In these cases the testis usually occupies the distal portion of the sac and rests on the outer surface of the aponeurosis directly beneath the skin and superficial fascia. It is evident that a diagnosis should be made in these cases before operation, otherwise in cutting down to the aponeurosis, the first land-mark of the incision for Bassini's operation, one would first pass through the testis before reaching the aponeurosis. The testis can be so easily felt in this superficial condition that a diagnosis should practically always be made. This type, which was regarded as extremely rare (Moschowitz having found only 17 in the literature) has been found to be by no means infrequently mentioned in our statistics at the Hospital for Ruptured and Crippled, the same showing 77 cases.

Another type is the inguinoperineal in which the vaginal process for some unknown reason, instead of entering the scrotum passes beneath the deep fascia and extends into the peritoneum for a varying distance sometimes reaching nearly to the anus. I have observed 8 cases. In these cases the cord is usually normal in length and by making a new pouch in the scrotum the testis and cord can easily be transplanted in the scrotum without any tendency to retraction. In some of these cases that I have operated upon I have found the testis normal in size and in other cases it has been atrophied.

In a considerable number of cases a bilocular sac has been found in which the testis occupies the upper loculus which lies between the inner and external oblique muscle, the lower portion of which extends into the scrotum. In a smaller number of cases I have observed a bilocular sac, in which the upper portion assumes the inguinosuperficial variety resting upon the aponeurosis beneath the skin and superficial fascia, and the lower loculus extending down into the scrotum. In these cases the testis usually occupies the upper loculus.

As regards operative procedure, the method employed at the Hospital for Ruptured and Crippled since 1890 has been practically the Bassini operation without transplantation of

the cord, namely: Bassini's incision, freely opening the aponeurosis of the external oblique well beyond the internal ring, surrounding the cord and hernial sac, which latter has always been found present, with only two exceptions. Then the lower portion of the tunica vaginalis is grasped by an artery clamp and by traction the testicle is brought down as far as possible. The next step is separation of the sac from the cord, high up, just outside the internal ring. In children this requires very careful and delicate dissection, as the cord is usually greatly enlarged and spreads out in a fan-like manner over an area of the sac one inch in width. If the dissection has been begun at the right layer, the sac can be easily isolated and is then tied off as high as possible. In most cases of inguinal and in many of the abdominal ectopia the cord can be freed sufficiently to permit the testicle to be brought at least into the upper portion of the scrotum, in most cases into the lower part, with the sacrifice of but few, if any, of the veins. Except in a very few of the early cases, I have never made any attempt to anchor the testis in the scrotum, but rely upon careful freeing of the cord high up and the removal of all fascial bands. Suturing of the testicle within the scrotum is, in my opinion, of little value. If there is any tension, the scrotum is retracted up toward the external ring. The canal is then closed by the modified Bassini method, without the transplantation of the cord. The cord is brought out at the lower end of the wound. The internal oblique is then sutured to Poupart's ligament over the cord. Great care is taken in placing the lowermost suture, which should include the reflected portion of the external oblique as well as the conjoined tendon and Poupart's ligament on the other side. This suture, when tied, makes but a very small external ring, too small ever to permit the testis to retract into the canal, even should it reach the ring.

In cases in which it is found difficult to get the testis into the scrotum, and this is particularly true in the abdominal

variety of ectopia, the admirable procedure advocated by Bevan, has been found of great value. In these cases we remove not only the fascial bands, but practically all the veins and vessels, with exception of the vas and the spermatic artery.

Another excellent feature of Bevan's technic[1] is a purse-string suture in the region of the external ring, including the superficial and deep fascia, which not only prevents the testicle from entering the canal, but also from passing up on top of the aponeurosis.

Brief Notes Regarding Patients Traced from Ten to Twenty Years

One patient, aged 15 years, traced 19 years: testis in good position.

One patient, aged 13 years, traced 20 years: testis atrophied and retracted to external ring.

One patient, aged 12 years, traced 19 years: testis normal; is married and has one child.

One patient, aged 10 years, traced 14 years: testis found in normal condition.

One patient, aged 6 years, traced 13 years: testis not felt.

One patient, aged 12 years, traced 11 years: testis just below external ring.

One patient, aged 11 years, traced 11 years: testis not down.

One patient, aged 11 years, traced 11 years: testis not felt.

One patient, aged 10 years, traced 12 years: testis normal in size and position.

One patient, aged 14 years, traced 12 years: testis found in inguinal region superficial to aponeurosis.

One patient, aged 10 years, traced 12 years: testis atrophied and situated at the spine of the pubis.

[1] Jour. Am. Med. Assn., 1903.

One patient, aged 12 years, traced 10 years: position of testis not stated.

One patient, aged 7 years, traced 11 years: testis atrophied lying on top of external oblique.

One patient, aged 10 years, traced 10 years: testis well down in scrotum and half normal size.

One patient, aged 18 years, traced 10 years: double scrotum; one side in scrotum; two-thirds normal size; other side not felt.

Cases Traced from Five to Ten Years

One patient, aged 5 years, traced 7 years: testis atrophied, outside of external ring.

One patient, aged 9 years, traced 8 years: testis normal size, at bottom of scrotum.

One patient, aged 11 years, traced 6 years: testis just without external ring.

One patient, aged 4 years, traced 5 years: position of testis not stated.

One patient, aged 11 years, traced 8 years: testis down and normal in size.

One patient, aged 5 years, traced 6 years: position of testis not stated.

One patient, aged 10 years, traced 5 years: double inguinosuperficial; position of testis not stated.

Boy, aged 8 years, traced and well 5 years: inguinosuperficial; position of testis not stated.

One patient, aged 11 years, traced and well 8 years: double, size of testes not stated as right in scrotum and left in mid-scrotum.

Boy, aged 12 years, traced 9 years: double inguinosuperficial; position and size of testes not stated.

Boy, aged 4 years, traced 5 years: position of testis not stated.

Boy, aged 14 years, traced and well 9 years: inguinosuperficial; position of testis not stated.

Boy, aged 7 years, traced 9 years: testis can be easily pulled down into the bottom of the scrotum.

Boy, aged 14 years, traced 7 years: double; right testis, inguinal left, abdominal type; position of testes not stated.

Boy, aged 13 years, traced 7 years: properitoneal; testis outside of external ring, freely movable.

Boy, aged 6 years, traced 6 years: testis small, at bottom of the scrotum.

Boy, aged 11 years, traced 6 years: testis half normal size; position external ring.

Boy, aged 4½ years, traced 8 years: testis not felt.

Boy, aged 8 years, traced 8 years: testis just above external ring.

Boy, aged 5 years, traced 5 years: testis at external ring.

Boy, aged 11 years, traced 5 years: both testes in bottom of the scrotum.

Boy, aged 14 years, traced 5 years: position of testis not stated.

Boy, aged 13 years, traced 5 years: double inguinosuperficial; both testes in scrotum and freely movable.

Boy, aged 10 years, traced 3 years: position of testis not stated.

Boy, aged 9 years, traced 5 years: position of testis not stated.

Final Results in the Cases Observed at the Hospital for Ruptured and Crippled

1 case traced; well over 20 years.
16 cases traced; well from 10 to 20 years.
41 cases traced; well from 5 to 10 years.
60 cases traced; well from 2 to 5 years.
31 cases traced; well from 1 to 2 years.
21 cases traced; well from 6 months to 1 year.
15 cases traced; well from under 6 months.
149 cases not traced.

334

In the cases of adults, as far as results are known, the testis has shown a greater tendency to remain in the scrotum than in children. The most important end-result in an adult is that in the case of W. A. O. N., male, aged thirty years, who had a double undescended testis. He was operated upon in 1895 on the left side by Dr. Shoonmaker, of Yonkers, and in 1910 on the right side by myself, at the Memorial Hospital. He was married early in 1902 and had a child born in April, 1903. This case is of particular interest, inasmuch as it is the second case that I have been able to find recorded in which a patient suffering from double undescended testes has become a father.

Another interesting case: W. G., aged thirty-seven years, was operated upon twenty-three years ago for a right undescended testis. I had an opportunity of examining this patient on December 11, 1918, and found the testis absolutely in the bottom of the scrotum; it was normal in size and felt just a little less firm in consistence than the opposite testis. The patient was married two years ago and up to the present time has had no children.

Conclusions. A careful study of our cases, together with the literature of the subject, has led to the following conclusions:

1. That in most cases of undescended or mal-descended testis the etiology points to a congenital origin, often influenced by the element of heredity and frequently associated —particularly in the double variety—with other developmental defects.

2. The atrophy usually found in the undescended or maldescended testis is not the result of the mal-position. The change in structure and the atrophy are merely coincident, being due to congenital causes.

3. The question of the functional value of the undescended testis, cannot be definitely answered in an individual case. It may be stated, however, as a general rule, that an

undescended or maldescended testis, with which there is associated a marked atrophy, has little or no functional value. However, I believe with Uffreduzzi that, in a considerable number of cases of undescended testis, the number of canaliculi with spermatosis in the retained testicle is greater than is usually believed. Uffreduzzi rates this as high as 10 per cent.

4. The ectopic testicle is practically always associated with an open vaginal process of peritoneum, *i. e.*, there is usually present a potential hernia. This vaginal process is almost invariably a congenital affair, for the reason that its position is entirely independent of the location of the testis.

5. Torsion of the cord is more frequently observed in the undescended testis than in the normal testis.

6. The undescended testis shows a greater tendency than the normal testis to malignant degeneration.

7. Operation should be advocated in children who have reached the age of eight to ten years, for the following reasons:

(*a*) Operation permits the radical cure of the hernia with which the undescended testis is practically always associated and which often cannot be controlled with a truss without causing pain and irritation to the testis.

(*b*) By bringing the testis down into the scrotum before the age of puberty, there is a possibility of causing further and more normal development of the testis.

8. Operation in adults or children over the age of fourteen should be even more strongly urged, for the following reasons:

(*a*) In order to cure the accompanying hernia, which as has already been stated is almost always present.

(*b*) In order to place the testis in a position in which it is much less subject to trauma.

(*c*) In order to lessen the chances of malignant degeneration.

(*d*) For the mental and moral effect upon the patient.

9. The end-results in our series show that it is possible to cure the hernia in practically all cases. Unfortunately, in only a comparatively small number of cases did we find the testis occupying the bottom of the scrotum in the cases observed, several years after operation. The atrophied testicle is generally found to have retracted to mid-scrotum or in the region of the external ring and in a position somewhat less liable to trauma, than before operation. The result accomplished by the operation, the cure of the accompanying hernia, would seem to justify advocating operation for the undescended testis in adults.

10. The question of whether the traumatism incident to the operation on the undescended testis might not favor the development of malignant disease, is one that should be considered. However, at present it cannot be answered definitely. It should be noted that in none of the series of cases operated upon at the Hospital for Ruptured and Crippled during the past twenty-nine years has malignant disease been known to develop; however, I have personally observed one case of sarcoma of the testis in which the disease was either present at the time or developed shortly after the operation for undescended testis; possibly it had already started at the time the operation was performed.

These conclusions differ slightly from the conclusions of my earlier paper. In that paper I stated that the undescended testis is almost invariably of little or no functional value. I believe this statement is somewhat too strong and should be modified to the extent that the undescended testis is probably of functional value in not more than 10 per cent. of the cases.

I still believe that the undescended testis should never be sacrificed in children and that the practice which obtains in some hospitals, of removing the undescended testis in a large number or even in the majority of cases, is greatly to be deprecated. Even if the testis be of little functional value, it nevertheless is of great value in developing the

manly characteristics in the child and promoting general health. In the adult it should likewise be retained for its influence upon the mentality of the patient, or the moral effect, if for no other reason.

As regards the age for operation, I still believe that operation is seldom indicated under the age of eight years. If the hernia is so slight as to be of little or no importance, it is better to wait until the child is ten to twelve years old before operating.

I still believe that abdominal ectopia, unless double, had best be left untreated, inasmuch as the operation is a difficult one and by no means free from risk. In children, however, I would never allow a case of double undescended testes to reach the age of puberty. In these cases it is safer to do the operation in two stages, operating on one side at a time.

It is interesting to note that there has been no death in this entire series of 415 operations.

DISCUSSION

Dr. Joseph C. Bloodgood, Baltimore, Md.—My experience with the operative treatment of undescended testicle is much smaller than that of Dr. Coley's, but this summer we had an opportunity to observe and record practically all hernias in our marines between twenty-one and thirty-one, and the percentage of undescended testicle I will give in the paper. It seems to be 2 or 3 per cent. There is a large number of these men with hernia and undescended testicle who volunteer for operation. We also had an opportunity to study the operative technic of transplantation of the testicle into the scrotum, and I hope Dr. Coley will discuss this phase of the subject in his closing remarks. It impressed me as most helpful in immediately loosening the testicle. We opened into the peritoneal cavity above the neck of the sac. In this type of hernia there is not always a distinct sac, but in congenital hernia, and these are congenital hernias; the sac has a more intimate connection to

the veins than the acquired sac. As I have said, we opened into the upper peritoneal cavity above the neck of the sac and divided the peritoneum some distance above the neck of the sac at a point where it could be easily separated by blunt dissection from the vein, so that there would be no danger of injuring the vein in closing the peritoneal cavity. The portion of the peritoneum adherent to the vein we made no attempt to remove. Therefore, there was no dissection of this portion from the vein. We then, with a sponge on a long clamp, attached this mass and vein in one hand, and with a sponge we made a blunt dissection and separated the veins up as far as we could from the surrounding tissue. That gave us an opportunity to pull down the vein; we found it was the vein, not the vas, that prevented the transplantation of the testicles. That is the chief difficulty. Theoretically, one would expect if we ligated the vessels, as advocated by Bevan (and we had a large experience with that in the earlier operations in cases that were sent to Dr. Halsted for operation), the vein should not be excised, and especially if one is going to transplant the testicle.

In the group of cases we have had during this year we have not resected the vessels in a single case, and with that little change in technic we have not had any difficulty in transplanting the testicle into the scrotum.

The second point is, we have made no effort whatever to adopt the plan advocated by Bevan. He states that if one does not suture this peritoneal sac or tunica vaginalis over the testicle in the scrotum, atrophy will follow. He does not give evidence to prove that statement. My experience shows that in congenital hernia, if we suture the congenital sac over the testicle rather than leave it very loose and open we have a larger chance for hydrocele later in life. In these cases we left the sac remaining about the veins, but we removed the sac that sometimes is present in the scrotum. It gave us a larger opening in the scrotum to get rid of the peritoneal sac there and then placed the testicle into the scrotum and it had no tendency to pull up. We sutured it there whether it is necessary or not. The assistant inverted the scrotum and we sutured the fascia of the testicle to the scrotum, and then we sutured it in a bed with chromic catgut. We held it there by layers of sutures so that the testicle need not get out of place. The statement that undescended testicle is more liable to disease is not borne out by the evidence.

Dr. Samuel J. Mixter, Boston, Mass.—The statistics about the operation for undescended testicle are always interesting, and I trust that in Dr. Coley's paper, as it will appear in the *Transactions*, he will give some analysis of the methods used; in other words, whether stripping of the cord of its vessels was done or not, because that is the whole point in the operation, whether we are bound to get with destruction of the vessels atrophy of the testis. Personally, I believe we are bound to get that atrophy of the testis if we do the operation as described by Bevan—at least in a very large number of cases—and these statistics, as presented by Dr. Coley this morning, do not go into that point except in a general way. I think in all these papers on undescended testis that is a very important point to be brought out, because if we are going to get atrophy or non-development after operations upon children an operation of that type certainly ought to be abandoned.

Dr. J. Shelton Horsley, Richmond, Va.—Three years ago, at a meeting of the Southern Medical Association in Richmond, Va., Dr. Gessner, of New Orleans, reported some very interesting experiments, in which he ligated the spermatic artery and vein in dogs and observed the effect on the testicle. This was done in order to throw some light upon the effect on the human testicle of operations for varicocele and for undescended testicle as recommended by Bevan. Bevan says that in a small proportion of his cases he divides both the spermatic artery and vein in order to lower the testicle satisfactorily. (*Surgical Clinics of Chicago*, December, 1918, p. 1103.) Gessner found that in all of these experiments there was degeneration of the testicle. The testicle would sometimes look normal on superficial examination, but on microscopic examination there was always degeneration of the cellular elements, and usually there was atrophy and cirrhosis.

Dr. Miles F. Porter, Fort Wayne, Ind.—Regarding the destruction of vessels, I have a very firm conviction, borne out by an experience not extremely limited, and yet not very large, that the effect upon the testicle of the destruction of the vessels of the cord depends in a large measure upon the age of the patient when the destruction is accomplished. Years ago, Lydston advanced the idea that one could destroy all veins of the cord without any danger of atrophy of the testicle. He

happened to be present when I had an occasion to try it, and I was foolish enough to do it. The patient happened to be a boy, and the testicle never grew. On the other hand, I have destroyed many dozens of times practically all vessels in the cord in the adult and never saw atrophy of the testicle follow. I have the firm conviction that one can destroy these vessels with impunity in the adult, but one had better be cautious about it in the growing child.

I want to emphasize what Dr. Bloodgood has said not only as to the advisability of destroying and not attempting to rebuild the tunic of the testicle in hernia, for one has a lot of hydroceles following reconstruction of the tunic. My advice to deal with a congenital sac in a hernia is to destroy it and leave the testicle without a sac. I have had very little experience in undescended testicle, but I have felt that the point made by Dr. Coley that the tissues about the cord surrounding the vas are the elements that prevent the lowering of the testicle is correct. The dissection of the cord, allowing enough vessels to provide for the nutrition of the testicle and removing of all others, it seems to me, in the majority of cases, will make the reposition of the testicle easy. I do believe, from my limited experience, which is in accordance with Dr. Coley's, that retraction of the second degree invariably occurs.

Dr. W. E. Sistrunk, Rochester, Minn.—I am very much interested in this discussion on undescended testicle. At the Mayo Clinic we see quite a number of patients who consult us for the treatment of this condition, and it is always a problem to know what to advise in the individual case. We have found that when we have followed Bevan's idea of cutting most of the vessels of the cord and depending upon the blood supply to the testicle being derived from the little artery which accompanies the vas, in a certain percentage of the patients there is a swelling of the testicle following the operation, with subsequent atrophy of the testicle. When these patients have passed the age of fourteen or fifteen we have found one of the difficulties in doing operations in which the testicle is replaced in the scrotum to be that the scrotum has failed to develop. Having no testicle in it in early life the scrotum fails to develop, and if at operation the testicle is placed in the small cavity which is present in it there has been a great tendency on the part of the testicle to retract upward and become attached along the side of the pubic bone.

In such position it is subjected to more trauma than it would have been if let alone.

We have gradually come to the point where we advise patients of this age who have only a small hernia with undescended testicle to let the condition remain as it is. In patients who have hernias which begin to produce considerable trouble after they have passed the age of maturity, if the testicle on the opposite side is good and in normal position we have advised that they allow us to use our own judgment as to the disposition of the testicle; then if we find at operation that the testicle cannot be replaced without injuring the bloodvessel greatly, and especially if the scrotum is undeveloped, we either replace it in the abdomen or remove it. We feel that the removal of the testicle in a man, when the other testicle is perfectly healthy, is justifiable, providing he is willing to sacrifice the testicle to get a good result. In many instances it will be found that the testicle can be replaced in the abdominal cavity by cutting the internal ring sufficiently to allow the whole testicle, the epididymis and the structures surrounding it to be placed in the abdomen, and closing the hernia up as a ventral hernia. In some instances there is a considerable amount of separation of the epididymis from the testicle, and the condition sometimes resembles a Fallopian tube and broad ligament in a female, and when this condition is very marked we prefer to take the testicle out.

Dr. W. P. Carr, Washington, D. C.—Most of the undescended testicles I have seen have been small and soft and apparently not more than half the size of the testicle on the opposite side. I have always taken them out. The only one I ever attempted to replace seemed to come down pretty well in the sac, but afterward it worked its way up over the pubic bone, became very painful there and had to be removed later. Most of those I have taken out I have cut open and examined. They seemed to be practically worthless. Considering the difficulty that may follow trying to replace them in the scrotum, I have been a strong advocate of removing these testicles, which I regarded, as a rule, useless. I have found the same difficulty that Dr. Sistrunk spoke of, atrophy of the scrotum, there not being enough room to replace the testicle, even a small one. I would like to hear the experience of others in regard to the size and apparent activity or usefulness of undescended testicles.

Dr. John T. Moore, Houston, Texas.—In going over the statistics to determine what one ought to do in a double undescended testicle it has occurred to me that we are apparently at sea. In Dr. Coley's statistics he gives only two instances of children, and, inasmuch as it is very difficult to know who is our father, these two instances are probably of value. I have been wondering whether anyone who has had a large series of cases has had the opportunity to determine whether there were any normal spermatozoa recovered from any case having double undescended testicles that had been operated on. It seems to me this ought to be determined.

Dr. Sistrunk spoke of putting the testicle in the abdomen, which would be a much better procedure if, as Dr. Coley says, there is no danger of the testicle becoming sarcomatous. That used to be the great bugaboo of all of us, so that those who have had a large opportunity should let us know what such examinations have shown.

Dr. Coley (closing).—First, in regard to Dr. Bloodgood's description of the operation. I have a full description of the operation in my paper, but I did not have time to read it. What Dr. Bloodgood emphasizes is very important, namely, to free the testicle before one opens the sac. I make a Bassini incision, freeing the cord, lifting up the lower end of the sac, including the testis, if it is of the abdominal variety. Here is the canal, for instance (illustrating on blackboard); and here is the testis. Then the testis and cord are lifted up and freed. As Dr. Bloodgood has suggested, I completely encircle the sac, dissect it free from the cord high up well beyond the internal ring. The sac is opened before attempting to dissect it from the cord.

I do not agree with Dr. Bloodgood as to the inadvisability of closing the lower end of the sac. After the cord is freed of all adhesions we make a pouch in the scrotum; it is always distensible, and the testicle is brought down and placed in the scrotum. But before doing that I make a purse-string suture of the lower portion of the sac, giving a new tunica vaginalis. The objection raised by so many surgeons that we are apt to have hydrocele is theoretical and practically hydrocele does not occur. We have not had one example of hydrocele in this entire series of cases. We have removed the testicle in two cases: one high up, and another of the internal variety which we found it necessary to remove. I believe the testicle is better with a good cover of tunica vaginalis.

As regards the removal of the veins, I would not have one get the idea that in our procedure we remove them as a routine measure. We have removed the veins in not more than 2 per cent. of the entire series of cases, so it is an extremely rare procedure with us. Dr. Horsley spoke of Dr. Bevan removing the spermatic artery. He does not, I believe, remove this artery but removes the veins. In some cases Dr. Bevan removes all the vessels except the artery of the vas.

In regard to putting the testis in the abdomen, I believe Dr. Bloodgood will bear me out in this, that we can nearly always get it in the scrotum if we go about it in the right way, although it is not an easy operation. It is a difficult operation, properly done, and one must learn how to do it properly. Putting the testicle in the abdomen has been done by a good many surgeons. One can experiment on animals, and what happens when one puts the testicle in the abdomen? It always atrophies and becomes of no value.

The great objection to removing these veins as a routine measure is that one gets atrophy of the testicle. A surgeon of Rio Janeiro, who used the original Halsted method for the radical cure of hernia in a large series of cases, states that atrophy of the testis occurs in 20 per cent. of them. We do not remove the veins except in a small number of cases, and we have not found atrophy of the testis when it has not already existed before it was brought down. I do not believe the operation, if we do not remove the veins, produces any further atrophy.

PANCREATIC LYMPHANGITIS, WITH AND WITHOUT JAUNDICE

By John B. Deaver, M.D.
Philadelphia, Pa.

During the past decade disease of the pancreas has been productive of a considerable amount of literature, for some of which I have to acknowledge responsibility. The pancreas is so commonly involved at operation for upper abdominal conditions that I have thought it worth while again to direct attention to it and to consider the relation between the pancreatic lymph glands and other abdominal viscera.

The gall-bladder, bile-ducts, pyloric region of the stomach and the second part of the duodenum, through their efferent lymph channels are placed in intimate relation to the head of the pancreas, and it is the head of the pancreas that is most frequently involved in pancreatitis associated with other upper abdominal diseases. The course of infection has time and again been observed at the operating table in gall-bladder diseases. Inflammation of the gall-bladder is followed by enlargement of the cystic lymph glands, periductal lymphangitis, enlargement of the glands at the head and at the margin of the pancreas, and often of the regional lymph channels at the head of the pancreas.

"The lymph drainage from the head of the pancreas passes through the lymph glands of the common and hepatic ducts. A cholecystitis causing great enlargement of these glands can produce pressure and jaundice, or a lymphedema or a

lymph-borne infection of the head of the pancreas, just as at times lymphedema is seen in the arm following amputation of the breast and removal of the axillary glands. The gland group in both instances drains three regions."[1]

Induration of the head of the pancreas about the common duct is present in 35 to 40 per cent. of diseases of the gall-bladder; not only in cases with common duct stone, but also in many cases in which the gall-bladder is only slightly diseased but in which there is enlargement of the lymph glands draining the gall-bladder, and also in a number of cases of strawberry gall-bladder, with or without stones.

In the course of my abdominal work I am becoming more and more convinced that the first stage of chronic pancreatitis is nearly always disease of the pancreatic lymph glands. This primary disorder can rarely, if ever, be diagnosed before operation, nor is a preoperative diagnosis of chronic pancreatitis always possible. In both conditions the predominant symptoms are those of some upper abdominal disease, with which they are more often than not associated, principally gall-bladder disease, peptic ulcer, disease of the liver or appendicitis. In the absence of definite indication of calculi the appearance of jaundice serves to suggest the possible cause of the trouble. The onset of jaundice in these cases, as a rule, is gradual and its intensity, variable at first, is apt to be more constant than when due to stones in the common duct.

The difficulties of diagnosis are illustrated by the following case, recently operated by me at the Hospital of the University of Pennsylvania: The patient, male, aged eighteen years, gave, as his chief complaint, jaundice, nausea and pain and weakness of the muscles of the lower extremities. The pain began four days before admission and two days later jaundice set in, first on the face and then covering the entire body, the skin becoming a muddy yellow. There was con-

[1] W. J. Mayo, *Collected Papers*, Mayo Clinics, 1916, viii, 269.

siderable nausea, vomiting, some spitting of blood, dizziness and languor.

Physical examination in addition to the jaundice showed slight epigastric pulsations, absence of peristalsis and abnormal breathing. No areas of tenderness were noted. The liver was palpated at the costal margin; liver dulness was percussed 8 cm. below the costal margin. The liver extended from the eighth rib to the end of the costal margin in the right mammary line.

Two days after admission the patient vomited medicine, food and a small amount of blood. Vomiting and evidence of bleeding continued at intervals for several days. The symptoms finally yielded to treatment and the patient was able to go home much improved one month after admission. Nineteen days later he returned, giving a history of having vomited two days previously, but which he attributed to dietary indiscretions. Jaundice was still marked and general weakness and stiffness of the lower extremities were present. Also he complained of bladder irritability and nocturnal frequency.

Examination showed increased enlargement of the liver, which was found to extend four finger-breadths below the costal margin. Palpation of the gall-bladder was doubtful. There was some tenderness over Mayo Robson's point. The patient later became stuporous and the temperature rose to above 104°. Vomiting continued. The attending physician diagnosed enlargement of the gall-bladder and referred the patient to me for operation. I found the gall-bladder to be slightly enlarged, but normal in appearance. The bile in the gall-bladder also was apparently normal, but its mucous membrane was granular in appearance. The pancreas was enlarged and slightly congested. The liver was very large and congested. Adhesions between the gall-bladder and the duodenum gave evidence of old inflammation of the gall ducts. Our operative diagnosis was therefore acute obstructive cholangitis. Operation consisted of draining the gall-

bladder. The postoperative course was most stormy, variations in temperature giving a genuine "steeple chart." The patient finally got well.

E. A Graham[1] has recently demonstrated that enlargement of the liver is a feature of 87 per cent. of cases with disease of the biliary tract—a rather too large percentage I am inclined to think. Nevertheless, he finds that this enlargement occurs regardless of whether or not calculi are present or whether or not there is obstruction of the cystic duct, and states that "if cholecystitis is well established it is very probable that ascending infection of the liver may constantly recur, possibly through the lymphatics surrounding the bile passages." We all know that a gall-bladder once infected rarely regains its normal condition. Its walls have a tendency to harbor bacteria, which in turn may lead to infection of the liver through the lymph channels around the biliary tract.

The following case recently operated by me at the Lankenau Hospital, Philadelphia, well shows pancreatic lymphangitis as the precursor of a pancreatitis, which was without doubt obviated by operation. The patient, a married woman, aged forty-two years, gave a history of eleven years of abdominal pain, often severe enough to require morphin for relief. There was no constancy in the time of the attacks, nor was there any relation to food intake. Four days before admission she experienced one of the very severe attacks, and after this became slightly jaundiced. There was no history of vomiting or nausea during the attacks. Her youngest child is eighteen months old; pregnancy was normal. Physical examination showed jaundice involving the entire body. The tongue was covered with a thick grayish coating. Teeth fair. Abdomen: tenderness in the gall-bladder area and increased rigidity in the upper right rectus. Diagnosis: gall-bladder disease.

[1] Surg., Gynec. and Obst., 1918, xxvi, 521.

A severe attack of pain the day after admission required morphin for relief. Jaundice increased. At the operation the following day the liver was found enlarged and congested, the gall-bladder distended and chronically inflamed. The gall-bladder was removed and when opened was found to contain muddy bile and many stones. Cystic duct opened and muddy bile exuded. Some adhesions around the hepatic flexure of the colon released. Pancreatic lymph glands very much enlarged. Head of the pancreas slightly enlarged. Chronically inflamed appendix removed. Jaundice began clearing the day after operation. The patient is still in the hospital and is doing well.

These pancreatic and peripancreatic inflammations, as I have elsewhere pointed out, are comparable to cervical adenitis following tonsillitis, or inguinal adenitis after an infection of the extremity. The subsidence of the infection in the gall-bladder is steadily followed by subsidence of the lymphangitis. In view of the fact that in the present state of surgery we have no successful means of directly attacking the chronically diseased pancreas, it is obvious that early treatment of this "prepancreatitis," if I may coin the term, is most desirable. Medical treatment is slow, not always successful, and offers no assurance against recurrence. Surgery gives reasonable assurance of removing all foci of infection and consequent freedom of recurrence.

Disease of the peripancreatic lymph glands without jaundice is demonstrated in the following instance: Male, aged thirty-nine years, admitted to the Lankenau Hospital, Philadelphia, complaining of upper abdominal distress after eating. History shows seven years of periodic attacks of epigastric pain four to six hours after meals. Pain relieved by alkalies. Also nocturnal pain, relieved by food. No constipation. No history of jaundice nor of gall-stone colic. No nausea or vomiting. Physical examination negative except for abdomen. Abdominal wall relaxed and peristalsis active. Stomach capacity 2700 c.c. Unable to wash out stomach entirely.

Stomach slightly ptosed. Roentgen rays confirmed gastroptosis and demonstrated pyloric obstruction. Diagnosis: duodenal ulcer. At the operation, adhesions, running across the duodenum to the gall-bladder, causing partial obstruction, were released. Enlarged glands along the neck of the gall-bladder and along the common duct. Spastic hour-glass contraction of the duodenum, which relaxed under manipulation. Peripancreatic lymph glands enlarged and hard. Head of pancreas large and hard. Some perisplenic adhesions released. A large chronic indurated ulcer was present at the junction of the pylorus and duodenum, the injection extending down into the duodenum and upward along the lesser curvature of the stomach. An anterior gastrotomy brought to view a large bleeding ulcer, one inch in diameter. Considerable blood was found in the stomach. The opening in the stomach was closed with chromic gut and linen, posterior gastro-enterostomy done. A chronically diseased gall-bladder was removed. The cystic and common ducts were found to be patulous. Appendectomy. Appendix fibrous. This patient made an uneventful recovery and has been entirely relieved of his symptoms.

Without enlarging upon the pathology and the surgical details of the question, I have cited these cases in order to emphasize the importance of early surgical treatment of upper abdominal disease before a possible pancreatitis has time to get in its destructive work.

STONE IN THE COMMON DUCT, WITH ANALYSIS OF FIFTY CASES

By A. Murat Willis, M.D.
Richmond, Va.

Probably in no other branch of abdominal surgery have greater advances been made than in that directed toward the relief of symptoms arising from the presence of biliary calculi. How successful are the measures undertaken for this purpose has been experienced by all of us who have seen symptoms of a most distressing nature relieved by surgical intervention and patients restored to a life of usefulness and comfort, when the future seemed to promise only invalidism and suffering. Unfortunately, however, this brilliant success does not always crown our efforts, and some of us, at least, can recall instances in which one, two, or even three operations on the same patient have failed to effect a permanent cure; or, still more unfortunately, our patient has succumbed soon after the primary operation.

There is no question that true recurrences of calculi do occur; that is, new stones are formed or descend from higher levels; but most of the "recurrences," so-called, are, in reality, due to calculi having been overlooked at the time of the primary operation. In this paper, I wish to discuss a condition that is of the utmost importance in the surgery of the biliary passages, both because it is responsible for a considerable number of these pseudorecurrences and al because to it must be charged the deaths of a large propor-

tion of our patients who succumb following operative procedures. This condition is stone in the common duct.

Calculi are present in the ductus choledochus, either alone or associated with the presence of calculi elsewhere, in a comparatively large number of patients operated on for the relief of gall-stone symptoms; the figures varying from as low as 4 per cent. in the older reports to as high as 20 per cent. in the more recent compilations. To what are we to attribute the discrepancies seen in the figures of different operators concerning the relative frequency of common duct stones? It seems to me that at least three explanations may be advanced: (1) The more skilled and experienced surgeon will detect calculi in this location when their presence would not be revealed to a less skilled operator; (2) patients who suffer from recurrences as well as those with the severe symptoms generally associated with common duct calculi, seek aid from surgeons of wide reputation, so that the clinics of such men will show a larger proportion of common duct cases; (3) some authors may include in their series cases of cholecystitis without stone, which, of course, would serve to reduce the proportion of common duct cases. It is an interesting fact that reports based on postmortem investigations do not give the extremely high figures of some surgeons. This is because the surgeon sees patients with symptoms, while many who at necropsy show the presence of biliary calculi have never given a history suggestive of their presence, and these "silent" stones are not so often in the common duct.

The total number of gall-bladder operations performed in my practice and in association with my late colleague, Dr. George Ben Johnston, is 620. Of this number, 512 showed the presence of calculi somewhere in the biliary passages, while there were 108 instances of cholecystitis without calculi. Stones were found in the common or hepatic duct in 50 cases, representing approximately 10 per cent. of the total number of patients with calculi.

There are certain features connected with these common duct cases that afford me satisfaction when I recall them, but candor compels me to state that there are other features the recollection of which does not cause similar gratification. I believe that a discussion of the latter points, which meant suffering or even death to our patients, will be more valuable in saving us from future errors than would be a recounting of such successes as we have experienced in the surgery of the biliary passages.

Reference to our figures will show that in 14 of our common duct cases the patients had previously been operated on. In 4 instances the presence of stones in the common duct was discovered at the time of the primary operation, but in view of the serious condition of these patients it did not seem wise to perform choledochotomy at that time. In 5 of the remaining 10, stones in the common duct had not been even suspected, either from the patient's history or from palpation of the duct.

We can quiet the voice of conscience by saying that some of these are instances of recurrence, but the probabilities are that in the majority of these 5 cases, the common duct calculi were present at the time of the primary operation, though their presence was not discovered.

How is this source of error to be eliminated? No matter how skilful a surgeon may be, a certain number of common duct stones will not be palpated; for the last or retroduodenal portion of the duct, particularly where it passes through the head of the pancreas, is at times difficult to palpate, and, according to Robson, this is the part of the duct in which lie the greater number of common duct calculi.

Unquestionably, exploration of the duct will serve to reveal some stones that otherwise would have been overlooked. When, however, is this procedure to be employed? If the classical symptoms of common duct stones are present, such as chills, fever and icterus, or if the duct is enlarged and thick-walled, or if many small calculi are present in

the gall-bladder or cystic duct, or if there is an atrophied gall-bladder, exploration of the common duct is unquestionably a justifiable course; but in my experience, in cases such as these, palpation usually suffices to demonstrate the presence of the common duct calculus. I believe that the majority of surgeons will agree in the opinion that routine opening of the common duct in all patients with gall-stones is not justifiable; yet I am convinced that unless this is done, a certain number of common duct stones will be overlooked and remain to cause subsequent symptoms. All of us can recall cases in which none of the classical symptoms of common duct stone were present, and yet operation revealed the presence of one or many calculi in that location.

In view of the reported simplicity of the operation and, according to the literature, the ease and certainty with which a choledochotomy enables us to drag all common duct calculi from their lurking places, it is with some humiliation that I confess that I have, apparently, failed to detect common duct calculi in certain cases, even after opening the duct. Of our 14 instances of secondary operation in which common duct calculi were detected, in 5 of the patients, stone or stones had previously been removed from the duct. Again, it may be asserted that these are instances of reformation or descent of calculi, but I am inclined to think that in some cases, at least, the stones were present at the time the duct was first opened, but were overlooked.

To summarize, it appears that:

1. Stones are present in the common duct in a considerable number of patients suffering from cholelithiasis.

2. A certain number of patients with stone in the common duct do not present symptoms sufficiently suggestive to justify exploration of the duct, and in some of these cases, palpation will fail to disclose the presence of the stone.

3. Even exploration of the duct sometimes fails to reveal the presence of calculi, though the previous and subsequent history of these patients may indicate or prove that stones were actually present.

The mortality in common duct cases subjected to operation is variously given at from 6 to 16 per cent. In our series, 5 patients died, giving a mortality of 10 per cent. In the series of gall-bladder cases, exclusive of those showing calculi in the common duct, the mortality was about 2 per cent. Hence it is evident that the operative risk is more than fourfold as great in gall-bladder cases. The obvious lesson is that in cholelithiasis cases operation should be performed early before the entrance or formation of the calculus in the common duct, and we are again reminded that cholelithiasis is essentially a surgical problem, and that medical temporizing is fraught with peril to the patients.

Report of Cases. Case I.—A white man, aged forty-two years, gave a history of having suffered from pain in the epigastrium for several years. Five weeks before his admission to the hospital he had a severe attack of pain in the right hypochondrium followed by jaundice. The jaundice had steadily increased and was as intense as that following cancer of the head of the pancreas. Abdominal examination disclosed a large, smooth tumor in the region of the gall-bladder. Operation revealed a large, distended gall-bladder containing bile and some blood. Bleeding was profuse from the skin wound, abdominal wound and through the tube from the gall-bladder. We were unable to control hemorrhage, and the patient died forty-eight hours afterward. Postmortem examination revealed three large gall-stones packed one on the other in the pelvis of the gall-bladder and cystic duct, the lower one partly extruding from the cystic duct and completely blocking the common duct.

In the light of the postmortem findings, I feel satisfied that that if this patient had been operated on a few days after the onset of his symptoms he might have been saved. The mechanical block was so great that it never could have been overcome by nature.

Case II.—A white woman, aged forty-two years, had suffered previous attacks of pain in the epigastrium, with

slight jaundice. The present illness commenced four weeks before admission to hospital with an attack of pain, jaundice, chills and fever. On admission, jaundice still persisted. Operation was delayed a few days in the hope of improvement in the patient's condition, but as none occurred, operation was advised. A high right rectus incision revealed a gangrenous perforated gall-bladder with pericholecystic adhesions. The gall-bladder was enlarged to the size of a small grapefruit, and was buried in adhesions. There was free fluid in the abdomen, and as soon as the adhesions were partly released, pus and bile-stained fluid began to well up and a perforation on the underside of the gall-bladder was located. A large amount of pus and a number of stones were removed from the gall-bladder. Stones were palpated in the common duct, but the general condition of the patient was so bad, and bleeding was so free where adhesions were released, that it was found impracticable to remove stones from the common duct. Free drainage was instituted in the gall-bladder and neighboring region. The patient died seven days later from hemorrhage and exhaustion.

Case III.—A white woman, aged thirty-five years, gave a history of having repeated attacks of epigastric pain and tenderness in the right hypochondrium. Three weeks before admission to the hospital she had a violent attack of epigastric pain, followed by a chill, temperature and jaundice. Abdominal examination on admission revealed a mass in the right hypochondrium, with jaundice, increased leukocytes and rise of temperature. A diagnosis of empyema of the gall-bladder was made and operation advised. Through a right rectus incision the gall-bladder was exposed and found to be buried in a mass of omental adhesions. It was opened and found to contain pus and stones. We were unable to palpate anything in the common duct, although the head of the pancreas was markedly enlarged. The patient made an uneventful recovery, with the exception of a persistent biliary fistula. Every time this fistula closed it would be

followed by mild attacks of epigastric pain, jaundice and fever. We made the diagnosis of stone in the common duct and advised another operation six months later. At the second operation a stone could be palpated in the common duct under the head of the pancreas. A retroduodenal operation was done, the common duct rotated and the stone excised from the back. Stitches were put in the duct and a small rubber drain put in the retroperitoneal space. As this patient already had a biliary fistula, we did not feel that a tube in the common duct was necessary. For two days following operation there was increased jaundice and a failure to discharge bile through the fistula. The patient began to have hemorrhage from the mucous membrane and fistula, and died four days later.

Case IV.—A white woman, aged sixty-five years, had been suffering with digestive disturbances, pain in the epigastrium and tenderness over the right hypochondrium for several years, and had jaundice with some of her attacks. Five weeks before admission to the hospital she was seized with severe colicky pain, chill, fever and jaundice. On admission her general condition was bad and jaundice severe. A diagnosis of cholelithiasis with stone in the common duct was made. We thought it best to delay operation, hoping that the jaundice would improve. Two days after admission to the hospital she had nose-bleed. As her condition did not improve, one week after admission we operated on her, removing stones from the common duct and gall-bladder and draining the common duct. For a few days she improved, then there occurred oozing through the drainage tube and gauze drainage in the cavity. This oozing continued off and on for about three weeks, until the patient finally died from hemorrhage and exhaustion.

Case V.—A white woman, aged forty years, was brought to the hospital two weeks after a severe epigastric pain, jaundice, chills and fever. Because of the intense jaundice we thought it was best to postpone operation. She was kept

in the hospital on continuous saline for six weeks, and the jaundice slowly disappeared. Three months after this attack I advised operation, although the patient was not clear of jaundice, but because of slight recurrence of symptoms I feared complete obstruction. On operation a stone was found in the gall-bladder and one at the head of the pancreas; the latter was easily pushed back into the common duct above the duodenum. The duct was opened and the stone removed. There was a tendency to hemorrhage in the common duct. For some reason the duct did not drain for the first twenty-four hours and then bile appeared through the tube and drain. Jaundice rapidly increased after the operation and the patient began to have hemorrhage from the stomach and mucous membrane. She died thirty hours later.

Comment. From the histories of our five fatal common duct cases it is seen that hemorrhage was the striking feature of all. Bleeding was the direct or strongly contributory cause of death in every instance. It is also apparent that the most rapidly fatal hemorrhage occurs in those patients in whom, for some cause, an acute exacerbation is superimposed on a chronic jaundice.

It has come to be universally recognized that delay and expectant treatment are indicated in some types of abdominal infection, but I am more and more inclined to believe that this rule cannot be followed with safety in cases of infection with obstruction of the common duct. Acute jaundice is not so potent a factor in producing the hemorrhagic diathesis as chronic jaundice is; therefore, hereafter, in common duct cases, the appearance of jaundice will be an important factor in my decision for immediate operation.

MALIGNANT PAPILLOMA OF THE GALL-BLADDER

By T. P. Waring, M.D.
Savannah, Ga.

The title of this paper may be attacked, but it expresses as near as I can figure it, the condition about to be described in this unusual case. It is for that reason that it is brought before this Association. It is, I believe, a question whether papillomata will extend directly to the lymphatic glands and become malignant. It is, however, clearly demonstrated in this case that such an extension does take place. I am not able to find in literature a similar condition, the admitted stand having been taken that papillomata of the gall-bladder remain benign and absolutely confined to the gall-bladder.

The previous history of the case tells several interesting facts. The patient had two attacks of puerperal insanity—one of the attacks after an abortion; she had one attack of jaundice after the second attack of puerperal insanity; she has borne four children, three of them without trouble. The family history is void of cancer. Present history of the case goes back three years and starts with pain in the right hypochondrium and a feeling of relief on pressure. Three weeks before admission to the hospital, she felt a lump in the right side, followed a few days later by pain. The pain was not severe; there was no fever or jaundice. The only symptom of cholecystitis was a constant feeling of indigestion. On admission to the hospital, examination shows a

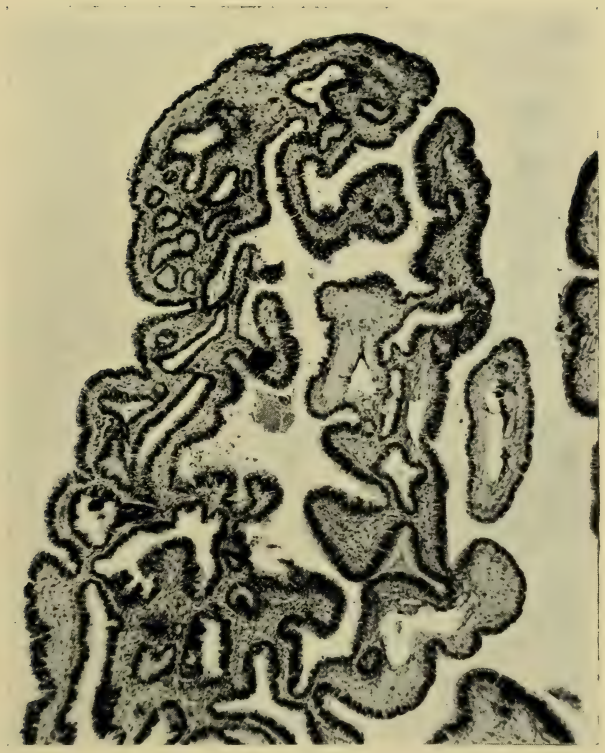


Fig. 1.—Papilloma. Low power.

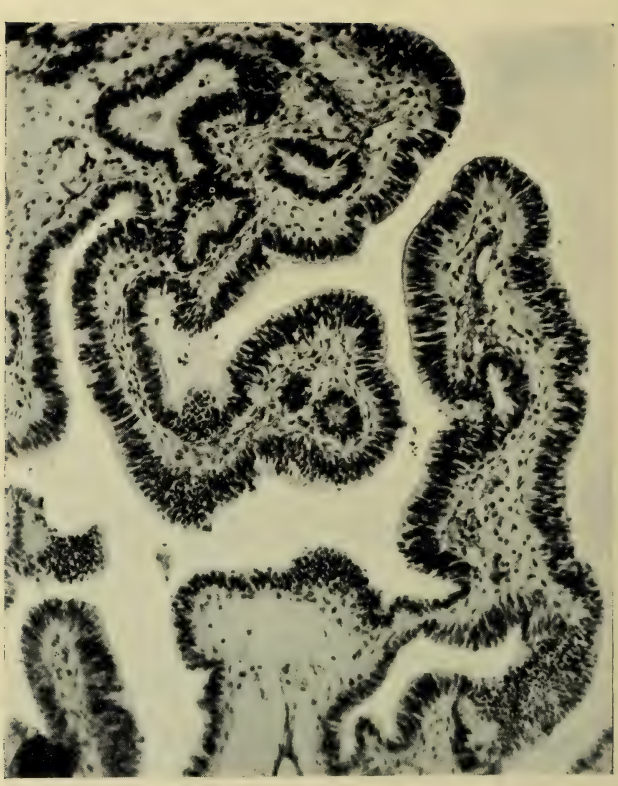


Fig. 2.—Papilloma. High power.

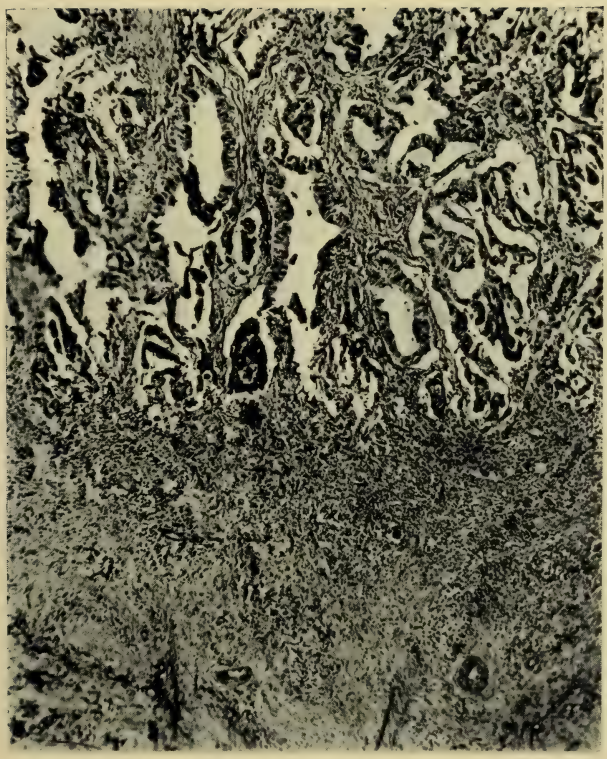


Fig. 3.—Gland showing glandular tissue and metastatic papilloma.

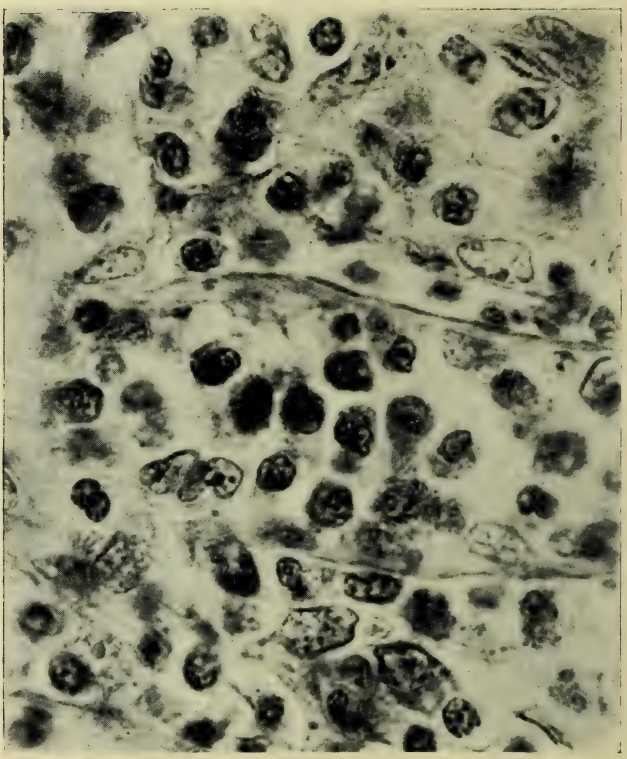


Fig. 4.—High power of malignant cells of gland.

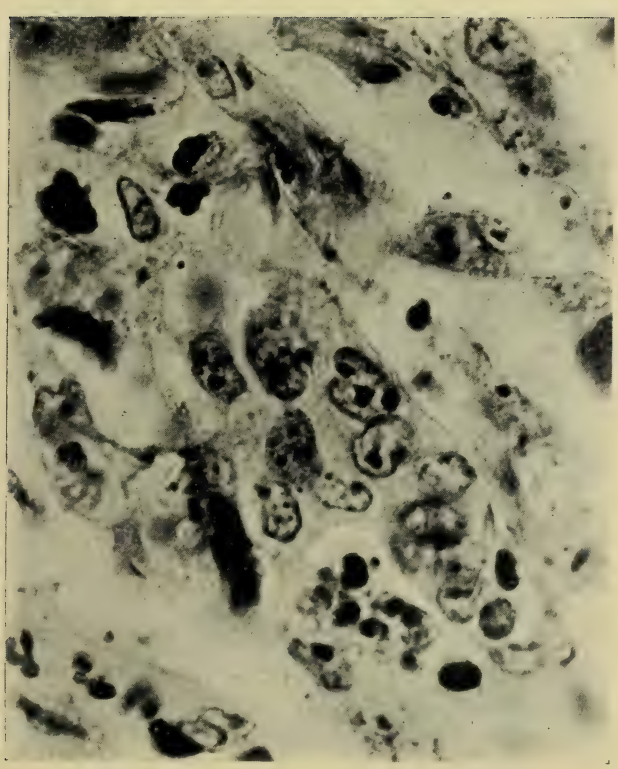


Fig. 5.—High power of malignant cells of gland

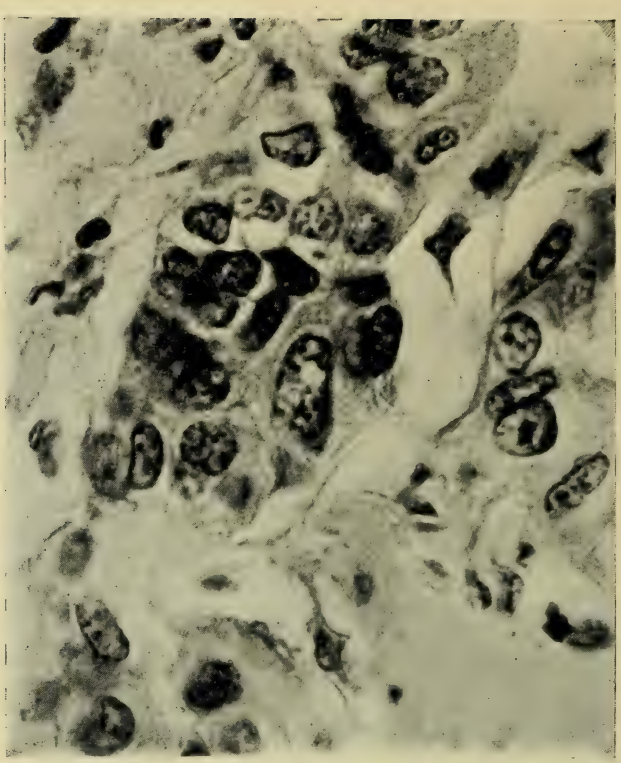


Fig. 6.—High power of malignant cells of gland.

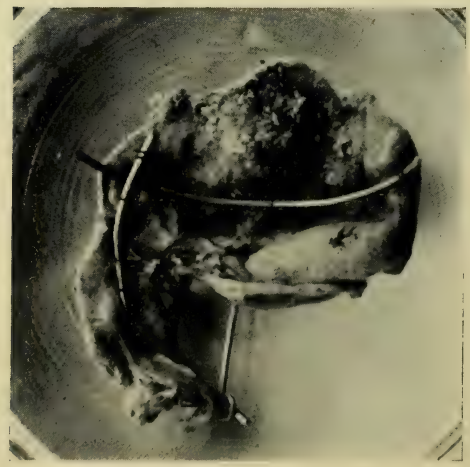


Fig. 7.

woman, aged forty-two years, well nourished; a little pale; skin thick; no jaundice. Blood contains 4,000,000 red and 8000 white corpuscles; 70 per cent. hemoglobin; blood-pressure, 120 systolic and 70 diastolic; constipated but stools of good color. A distinct globular mass can be felt in the right hypochondrium, a little sensitive to pressure but otherwise causing no discomfort.

At operation a large gall-bladder presented; color rather dark and glistening; walls not very thick; several masses could be felt in the gall-bladder, and two small lumps along the cystic duct forming part of the tumor mass, apparently in the gall-bladder itself, but proved to be enlarged lymphatic glands.

The pathological report was as follows: Thick walled gall-bladder measuring 10 cm. long and 11 cm. in circumference at the largest diameter. Contents, small amount of ropy bile, fine sand and three stones 2.5 mm. in diameter, all free in the gall-bladder. The walls of the gall-bladder much thickened averaging about 3 mm. The mucous membrane of the fundus is largely replaced by sessile and pedunculated papillomata covering an area 5 x 3 mm., their height varying from $\frac{2}{3}$ to 1 cm. At the junction of the body with the cystic duct there is an irregular ulcer 2 mm. in diameter and radiating from it are bands of scar tissue. On the outside of the duct, which is angulated around it, is a hard gland 1.5 mm. in diameter. On gross section the gland cut smoothly, is firm and solid, and has a grayish yellow mottled appearance. Microscopic section of the papilloma shows large discrete villi, covered by single layers of large cylinder cells, with well-marked elongated nuclei, situated near the middle of the cell: Of the ulcer shows base covered with necrotic tissue and round-cell infiltration of the edge and adjacent tissue. The gall-bladder wall replaced by fibrous tissue: Of the gland section shows typical lymphoid tissue interspersed with fibrous and papillomatous tissues, the latter making up the larger part of the gland. The papillomatous

villi are similar to those found in the gall-bladder, except that the cells are arranged with less regularity and are in several layers, instead of a single layer giving evidence of rapid proliferation. The nuclei are irregular in size, and round rather than elongated as in the gall-bladder.

The subsequent history of the case bears out the malignancy, for although the dissection was clean and no other enlarged glands could be felt, the patient developed an obstructive jaundice three months later. This was relieved by establishing a hepatic-duodenal anastomosis over a rubber catheter, making use of the sinus wall to attach to the duodenum covered and protected by the gastrohepatic and greater omentum. This gave absolute relief for four months. The patient, declining further operation, died two months later from obstruction.

DISCUSSION

Dr. William Carpenter MacCarty, Rochester, Minn. (by invitation).—The paper of Dr. Waring is especially interesting to me because in 1910 I found one papilloma in 365 gall-bladder specimens and prophesied that somebody would find a malignant one. So far as I have been able to determine, papillomata occur in 3 or 4 per cent. of all gall-bladders removed at operation in our clinic. Perhaps all of you have heard of the term "strawberry" gall-bladder; there has been considerable discussion from a clinical standpoint regarding this condition. From a pathological point of view these so-called strawberry conditions bear a close resemblance to papillomata. A papilloma is undoubtedly an advanced stage of a single villus of the type found in the strawberry condition. If we examine the papilloma and the villi of "strawberry" gall-bladder we find the subepithelial cells filled with a lipoid substance which gives both conditions the yellow appearance. In 1910 I described this appearance of the gall-bladder as being due to erosions of the villi. About the same time Sir Berkeley Moynihan spoke of this condition as being due to deposits of stones; as a matter of fact, we both

were incorrect, as recent experience has shown. As I have said, I have never seen a definitely malignant papilloma in the gall-bladder, but I have always believed they might be potentially malignant, and now I know they can become malignant after listening to the paper of Dr. Waring. The frequency of papillomata is so great that it demands more attention from the clinical and pathological standpoint.

Dr. Henry O. Marcy, Boston, Mass.—The first case I ever saw of stone impacted in the common duct was the first one ever reported as removed in America, if not in the world. It was a puzzle to me. I removed a large stone from the gall-bladder, and here was an obstruction rarely diagnosed. The common duct was apparently healthy; it was fully as large as my little finger, and we found something solid at the entrance of the bowel. We tried crushing the stone. I remembered very well the statement of a farmer who said that a calf got an apple in the neck and could not swallow it, and he was going to kill the calf. His boy of fifteen asked that he might try to relieve his pet. With a mallet and a block of wood he crushed the apple and the calf speedily recovered. We tried the process of crushing the stone in this case, but it was not successful; I therefore made an incision through the duct and withdrew the stone, which weighed 59 grains. We concluded that the duct was normal, although dilated, so we closed it with three lines of buried absorbable sutures. We closed the gall-bladder in the same way and put the patient to bed. On awaking from the anesthetic the patient vomited bile freely, a demonstration that the biliary passage was patent. The icterus was extreme. However, she made a good recovery, and I saw this woman only a few days ago, the operation having been done in 1889.

Dr. Ernst Jonas, St. Louis, Mo.—Dr. Willis advocates that we should resort to gall-bladder surgery very early before the development of common duct stone. The trouble I have had in some cases is that they had developed common duct stone by the time the gall-bladder disease was diagnosed.

A point brought out is that we should open the common duct to make it absolutely sure that we do not overlook a common duct stone. All of us know that if we do not open the common duct we cannot be absolutely sure that there is no common duct

stone. But even if we do open the common duct it is possible to overlook a stone or stones in the common or hepatic ducts. I have had personal experience with two such cases. In one case I opened the common duct, removed one stone and two months thereafter two small stones discharged through a small fistula, which had remained after the operation. The patient had had virtually no discomfort.

In another case in which it was necessary to mobilize the duodenum to remove six stones from the common duct, I felt sure at the time of the operation that no stone was left, but my assistant said there might be a stone left nevertheless. I thereupon opened the duodenum, introduced a piece of gauze, swabbed the channel but found no stone. Six months afterward, however, a few stones were discharged through the primary incision.

Dr. Waring (closing).—I was led to report this case of malignant papilloma of the gall-bladder by the fact that I had been interested in reading a report of Dr. MacCarty in which he detailed a considerable number of cases of papilloma of the gall-bladder. He was looking for a malignant one and had never found one. I had hoped he would be here and I consider that we are very fortunate in having him present today to discuss this subject.

CONGENITAL DIVERTICULA OF THE INTESTINES

Report of a Case of a Tumor Growing from the Tip of an Apparent Congenital Diverticulum in the Lower Sigmoid Region

By William T. Black, M.D. F.A.C.S.
Memphis, Tenn.

The vitelline duct which is attached to the ileum should disappear between the sixth and seventh weeks of intra-uterine life. At this time it should change from a tube to a cord, which, in turn, melts away, leaving the bowel free from its connection to the umbilicus. When it remains, we have a diverticulum. Diverticula are either congenital or acquired. This paper deals only with the congenital, or inherited type. A true diverticulum is the remains of the vitelline or omphalomesenteric duct, that is, its intra-abdominal portion. Lavata in 1671 was probably the first to call attention to the diverticulum, and later Ruysch described it more accurately. It remained for Meckel, by whose name the diverticulum is called to give to the world its true pathological and surgical significance. (The acquired types have assumed their importance both from a pathological and a surgical viewpoint, and have been elaborated upon by many able writers, and will, therefore, not be discussed in this report.) Meckel's diverticula are estimated to be present in about 2 per cent. of the people. It varies in length from 1 to 20 cm., and is usually found from 30 to

290 cm. (average distance 100 cm.) above the ileocecal valve. In the child the distance is less, where the yolk-stalk was attached. In cases in which the lower limb of the primitive intestinal loop has undergone excessive development, it may be found in the cecum or colon. (Binnie's Surgery, 1917.) It at times remains patent throughout, and you may have present fecal matter exuding from the umbilicus, or it may be closed on the intestinal side, and open at the umbilicus, but usually, however, the distal end is closed and the proximal end open. They vary in size from a very small cord-like structure to one as large as, or even larger than, the lumen of the gut. There may be smaller false diverticula connected with a true diverticulum, which may be bulbous at its distal extremity and narrow at its intestinal end. Both extremities may be occluded and patulous in the center. Sometimes there remains only a fibrous cord and sometimes only bloodvessels. They usually arise from the convex side of the gut, but may spring from the mesenteric side and may have a mesentery of their own. Wellington says that in about one-third of the cases they are attached to the umbilicus or adherent to some other part of the anatomy.

A preoperative diagnosis of the presence of a diverticulum cannot be positively made. A probable diagnosis may be made in those with a fecal discharge at the umbilicus. A discharge of any character at the umbilicus, with a sinus present or growth, is suggestive. Especially is this true in children in which the child is afflicted with gastro-intestinal symptoms. Right-sided abdominal pain which continues or follows the removal of the appendix, after a careful inspection of other organs, which are found to be normal, is suggestive to a certain extent (if adhesions can be ruled out) of a diseased diverticulum. The *x*-rays may prove of benefit in making a preoperative diagnosis.

Mumford estimates that 13 per cent. of diverticula become inflamed or diseased. The principal danger, then, lies in these 13 per cent. of cases, for all know the frequent occur-

rence of intestinal obstruction and the large mortality of the obstruction when produced by a diverticulum. In 22 cases at St. Thomas's Hospital from 1887 to 1908, 63.6 per cent., died, which mortality was 1 per cent. higher than from all other sources, including cancer. Hilgenreiner's report of 102 collected cases in 1902 shows a mortality of 71.5 per cent. Murphy stated that 5 or 6 per cent. of intestinal obstructions were due to this source. The majority of people who possess diverticula are without symptoms. Diseased diverticula will produce symptoms in proportion to the extent of the pathology present. Symptoms simulating an acute or chronic appendix may be present; the symptoms of obstruction, or symptoms due to growths which spring from them, give the usual symptoms of such conditions.

Report of Case.—The following patient came under my service at the Baptist Memorial Hospital, October, 1918: Mrs. Mary S., aged fifty-nine years, white, female, American. Did housework and work in the field. Family history negative. Denies previous history of syphilis, cancer, tuberculosis, etc. Has had the usual diseases of childhood.

Past History. Patient married at the age of fourteen years. Physical and mental appearance fair. The patient began four years ago to have pain in the right iliac region, sharp and shooting in character. Was not accompanied by any gastro-intestinal disturbances. The pain subsided in about three weeks. Some time later she discovered a lump in her abdomen, which was movable but not accompanied by pain. Tumor did not disable the patient at all, only causing a slight discomfort and constipation. About two years ago the abdomen commenced to enlarge and has continued to enlarge ever since. Abdomen was largest on the left side. The tumor seemed to stay one size for twelve to fifteen months, then began to enlarge rapidly, with symptoms of bearing-down pains in pelvis, backache, dyspnea, etc.

Menstrual History. Appearance of first menstruation, aged fourteen years. Regular, twenty-eight day type; four to five days' duration; quantity of flow normal. Menopause occurred at the age of fifty. Patient is the mother of eight children, the oldest forty-four years, youngest seventeen. Labors were normal. Was not attended by a physician during any of her labors. One premature labor of eight months. No complications or sequelæ followed any of her confinements. No leucorrhea. Bowels constipated. Frequent micturition for past few months. Suffers with indigestion of late. Nervous symptoms negative. Previous treatment medical.

Physical Examination. Well-developed, poorly nourished. Lost several pounds in weight during past few months. The skin jaundiced and wrinkled. Eyes normal. Teeth bad. Breath foul. Thoracic cavity negative. Heart negative. Blood-pressure: systolic, 155; diastolic, 110. Abdomen distended to about the size of a nine months' pregnancy. Tumor hard and irregular in outline excepting on the upper and right side, which fluctuates upon palpation. Flatness over the entire abdomen, excepting a tympanitic note over the colon. No tenderness. Spleen or kidneys not palpable. Liver normal. Excepting slight emaciation, extremities normal. Urinalysis negative. Blood count: leukocytes, 6800; reds, 4,048,000; polynuclears, 80 per cent.; small lymphocytes, 12 per cent.; large lymphocytes, 4 per cent.; eosinophiles, 2 per cent.; Wassermann test negative.

Vaginal Examination. General appearance of vulva normal. Slight leucorrheal discharge. Perineum negative. Cervix pushed up under the pubic region. Uterus pushed forward. Appendages not palpable. A large mass present.

A preoperative diagnosis of either a large subserous myoma with cystic degeneration or an ovarian tumor was made. The patient was operated on October 4, 1918. Ether anesthesia. Median abdominal incision was made from the pubes, extending up nearly to the ensiform cartilage. Findings, large irregular cauliflower-shaped tumor, filling up the

Rough sketch showing attachment of tumor to diverticulum.

entire pelvic and abdominal cavities, with marked cystic degeneration. No free abdominal fluid was present. Weight 4260 grams.

There were two large cysts at the upper right portion, each about the size of a large grapefruit, filled with chocolate-colored fluid. The tumor was entirely free, not connected with any structure, excepting at its origin. However, in one place one cyst was adherent to the anterior abdominal parietal peritoneum just below and to the right of the umbilicus. The adherence of the cyst to the peritoneum was loosened and the mass lifted out of the abdominal cavity. The origin of the tumor sprang from the tip end of a diverticulum. The diverticulum had its origin from the lower portion of the sigmoid (rectosigmoid region). It sprang from the convex side of the gut. There was no mesentery on the diverticulum. It was about 11 cm. in length and about the size of the little finger. The diverticulum was caught with two clamps and cut. The probe was pushed through the diverticulum to the gut to confirm its character. A purse-string suture was passed around the gut end and the stump was treated as the stump of an appendix is usually treated. I was surprised to find such an origin, as I expected to find the tumor coming from either the ovary or the uterus. There was not an adhesion to any pelvic or abdominal structure except where the cyst was attached. The uterus and appendages were normal. This mass had every appearance of springing from only the endothelial or serous side of the intestines. I particularly noticed the absence of large bloodvessels running through the diverticulum as one would expect to find in as large a tumor. There was a small mass in the hilum of the spleen. There was no evidence of metastasis in any other organ.

I submitted part of the tumor to three different pathologists for histological examination. The following is the report of Dr. H. T. Brooks, professor of pathology and histology, University of Tennessee, College of Medicine:

"The following is the pathological report on the specimen sent by you from the Baptist Hospital:

The specimen as a whole would probably fill a one and a half to a two gallon bucket. The external surface showed many small and a few large papillary projections. Here and there were large and small fluctuating masses indicating the presence of cysts. Everywhere the tumor had a markedly gelatinous appearance. Sections through the tumor showed cysts of varying sizes, one holding a pint or more of fluid. The fluid was brownish in color. The contents of the cyst showed no mucin. Microscopic examination of six different areas of the tumor showed several layers of epithelial cells, with no indication of downgrowth into the stroma. The several layers of cells, however, point to a malignancy on the part of the tumor. The stroma, everywhere, showed extensive myxomatous changes and this accounts for the gelatinous appearance of the tumor. (It was my impression, at first sight of gross specimen, that it was due to a mucous degeneration on the part of the epithelial cells. This, however, was incorrect.) Diagnosis: malignant cystadenoma, the stroma of which has undergone an extensive myxomatous change."

Dr. Krauss' Laboratory, Memphis, Tenn. First Report:

"Examination of specimen submitted shows bad fixation. Such tissue is apt to be autolytic and consequently indistinct. Two areas have been picked out. The most developed cells have the characteristics of fibroblasts from endothelia. The younger ones (sometimes in islands) are normal and rather small, but evidently purely endothelial cells. The stroma is myxoid. I regard it as myxoma, springing from the serosa and preserving some of the characteristics of endothelial origin." (This report was based on small sections of the tumor sent to him).

Dr. Krauss: Second Report:

"The following is the report upon the tumor mass submitted to me after I had reported on the sections made from

the smaller pieces: The entire mass, impregnated with formaldehyde, weighed 1420 grams, or about three pounds. It is bluish white in color, translucent, very lobulated, with numerous fine cauliflower-like exuberances. Many of the warty masses are cystic. Some of the cysts are imperfectly formed, the tissue gradually merging into a mucoid material. The larger, older cysts are smooth-walled with patches of cauliflower protruding into them. These contain clear serous fluid and remind one of papillary ovarian cystoma. Microscopically, the stroma is partly fibrous, and partly mucoid, with islands of proliferating endothelia, often seen to connect with spaces that have a very primitive structure and lined by round and oval cells with vesicular nuclei. Fixation, however, is not good. The covering of the entire polypoid mass is very scanty and shows thickening only in a few places. The stroma is the only active tissue and the blood supply is exceedingly scanty. Diagnosis: Fibromucous peritoneal polyp. Although the gross resemblance to an ovarian tumor is striking, there is nothing in the histology to suggest any ovarian origin." (The above were specimens obtained by Dr. Krauss from about one-third of the tumor, which was sent to him).

The following is a report of Dr. W. G. McCallum of the Department of Pathology, Johns Hopkins University:

"The specimen appears to me to be a papillomatous growth composed of very loose and edematous stroma rather denser near the surface, and forming large rounded papillary masses. It is in protected places covered with a layer of epithelium, which is in places cylindrical although usually cubical or flattened. In exposed places the epithelium is rubbed off and the superficial surface of the stroma appears as though the basement membrane had been lifted up by fluid. There was a wall, on both sides of which the papillary masses seemed to project, but the sections do not show this —probably those cut deeper in the block will do so."

From the above pathological reports it makes it impossible

to definitely name the type of tumor present in this case. However, I believe it to be potentially a malignant type tumor, but submit the reports for your consideration.

The tumor was evidently in the stage of regression, which was probably due to a poor blood supply. There were no vessels of any size in the diverticulum and the growth probably got its principal sustenance from the peritoneal fluid. Unless the small mass in the hilum of the spleen was a coincidence, then one would naturally think that the tumor was a malignant one, and this a metastatic growth. I am unable to account for such a mass as this growing from only the outer coat of the diverticulum. If it was a malignant tumor, I am unable to find an exciting cause. It is improbable to suppose that peristalsis or the movements of the other viscera could produce any irritation. It is possible that when the patient had the severe pain in her abdomen, four years ago, she had a diverticulitis; or that an ulceration might have been produced from within, which extended to the outer portion of the diverticulum and probably ruptured. The formation of a malignant growth can at times be accounted for by the retention of hardened fecal matter or concretions acting as predisposing or exciting causes. The retention of dry fecal matter or foreign bodies in this location is favored by a constriction at the sigmoidrectal portion. We have in the lower sigmoid, in the embryological stage, a dilated or pouch-like condition present. This dilatation may continue in the adult as an embryonal defect, which might further assist in the retention of fecal matter and account for the diverticulum. Strictures or growths of the rectum, hemorrhoids or any inflammatory process involving the rectum would naturally resist the proper expulsion of the intestinal contents. Too long retention of this fecal matter or concretions might in a certain percentage of cases produce an erosion or ulceration, which might act as a starting-point of a precancerous lesion. The same might apply to a diverticulum in this region. In the case reported, however, there was no hardened fecal matter or foreign bodies present,

and the diverticulum and the sigmoid were macroscopically normal everywhere except at the attachment of the growth. The principal etiological factor can, I think, best be explained through an embryological condition of fetal rest or transplantation of tissue from some other organ. I am unable to find in the literature at my disposal a description of a similar case. Doubtless, however, other cases have been observed and recorded of a like character. A congenital diverticulum is unusual in this portion of the gut, and can only be accounted for through an error in development.

Bizé, in 1904, Devé, in 1906, Denucé, in 1908, report cases of small pancreatic tissues growing from the tip end of a Meckel's diverticulum.

Colmers, in 1906, published an article upon intestinal cysts and their treatment. He says: "Raesfeld was the first to describe an enterocystoma, and that he drew attention to the fact that it developed from a Meckel's diverticulum. (Cullen.)

Cullen, Cowardine, Rimbach, Roth, Tiedeman, Colmers and others have reported cystic tumors connected to the remains of the omphalomesenteric structure. In Rimbach's case the tumor was as large as a man's head and adhered to the omentum.

Most of the reported cases have been small tumors, usually cystic, and connected with Meckel's diverticulum in the iliac portion of the intestinal tract or at the umbilicus. Mayo reports the rupture of a sigmoid diverticulum which was thought to be congenital in type, forming an abscess in the pelvis. Cases of carcinoma are reported in which a diverticulum was involved secondarily by contiguity of tissue. The treatment of an inherited diverticulum depends upon whether the organ is diseased, upon its location and upon its structure and size. All diseased diverticula should be removed. All diverticula when attached to some other structure at its distal end should be removed. Those with small proximal openings and all found in the large gut, where solid feces is found, should be removed. When the vitelline

duct remains as a cord or a set of bloodvessels it should be excised. Large normal diverticula, discovered accidentally in the small intestine (where we have only liquid feces present), should be let alone for fear of increasing the mortality.

Conclusions. This tumor was apparently connected only to the serosa side of the gut (diverticulum). Potentially, it was a malignant growth. A diverticulitis or perforation could be assigned as a predisposing or exciting cause, although it can probably best be attributed to a fetal inclusion.

I believe this diverticulum to be one congenital in type from all of its characteristics, but might possibly be one of the acquired type.

Unless one can palpate the uterus and ovaries, a differential diagnosis cannot be made between a uterine myoma, with a pedicle, or an ovarian tumor, and a tumor growing from a diverticulum in the lower sigmoid region.

The patient made a good temporary recovery.

Bibliography

1. Mumford: Practice of Surgery.
2. Taylor: Cancer.
3. Harbin, R. M.: Meckel's Diverticulum, with Special Reference to Umbilical Disorders of Infancy, Southern Medical Journal, February, 1917.
4. Da Costa: Surgery.
5. Moynihan: Abdominal Operations.
6. Keen: Surgery.
7. Kelly and Noble: Gynecological and Abdominal Surgery.
8. Kelly and Cullen: Myomata of the Uterus.
9. Binnie: Treatise on Regional Surgery, 1917.
10. Mayo, W. J.: Acquired Diverticulitis of Large Intestine.
11. McGrath, B. F.: Intestinal Diverticula, Their Etiology and Pathogenesis.
12. Cullen: The Umbilicus and its Diseases.
13. Prentiss: Text-book of Embryology.
14. Collected Papers of the Mayos, 1912.
15. Kelly and Hurdon: The Vermiform Appendix and its Diseases.
16. Burghard: A System of Surgery, ii, 541.
17. Delafield and Prudden: Text-book of Pathology.
18. Adami: The Principles of Pathology, 9th edition.
19. McCallum: A Text-book of Pathology.

RESECTION OF THE CECUM AND ASCENDING COLON

By J. Shelton Horsley, M.D.
Richmond, Va.

The principles that underlie an operation are more interesting than the mechanical details of the technic. The influence of certain physiological and pathological laws in causing the abandonment of lateral intestinal anastomosis and the gradual adoption of the end-to-end method is particularly striking. When surgeons began to use the needle and thread for uniting intestine instead of mechanical appliances, lateral anastomosis was much in vogue. Fifteen years ago when this transition was occurring, probably the majority of all intestinal resections were followed by lateral anastomosis, particularly if the colon was involved. At present the opposite is true and even in the large bowel the end-to-end or axial union is becoming popular. Two recent papers, one by Lockhart-Mummery[1] and the other by Donald C. Balfour[2] have strongly advocated this method in colonic surgery.

Senn and Reichel called attention to the interference with peristalsis at the site of lateral anastomosis. Cannon and Murphy,[3] after a roentgen-ray examination of animals in which end-to-end and lateral intestinal union had been done, found that there was not the "slightest evidence of stasis of

[1] Surg., Gynec. and Obst., February, 1917, 247.
[2] Tr. Southern Surg. Assn., xxx, 343.
[3] Ann. Surg., xliii, 512.

food in the region of operation" with an end-to-end method. On the other hand, peristalsis was apparently abolished in the region of a lateral anastomosis, the fecal contents being pushed through the anastomosis only when a column of it extended into the unaffected proximal (oral) loop of bowel where peristalsis was unimpaired.

The reasons for this are that the opening is not in the axis of the bowel, the severed circular fibers cannot act upon the bowel contents satisfactorily, and there are two blind pouches in which the feces tend to collect. The proximal (oral) intestinal pouch is emptied with great difficulty. I have seen a dog die as a result of a small piece of bone lodging in this pouch and ulcerating through.

Lateral anastomosis is made in the direction of the long muscle of the bowel and these external longitudinal fibers are split instead of being cut across as in the end-to-end method. Contraction of these fibers tends to close the opening in the bowel and a very long lateral anastomosis has to be made to prevent too much contraction.

There is more suturing to be done in lateral anastomosis. The two ends of the bowel have to be closed and then two openings made into the bowel and the wounds sewed together. As a final objection to lateral anastomosis, it requires much more bowel to make a lateral than an end-to-end union. In the small intestine this is of no great consequence, but in the colon it may be very serious, as shown by Lockhart-Mummery, and may result in resection of too small an amount.

The objection that has been urged to the end-to-end method has been that it would leak at the mesenteric border. As pointed out in previous communications, in which a new method of intestinal union was described,[1] the triangular space where the mesentery splits to envelop the bowel has been considered a bad place. This is because the operator

[1] Ann. Surg., xxxviii, 747; Tr. Southern Surg. Assn., xxi, 198; Southern Med. Jour., viii, 298; Surgery of Bloodvessels, J. Shelton Horsley, M.D., published by C. V. Mosby Co., 1915, p. 204.

by cutting into this space with the same scissors or knife that divides the mucosa of the intestine infects this triangular space, which is rich in lymphatics and bloodvessels, and the infection causes the sutures to give way. It can be avoided by dividing, clamping, and tying this space and by clamping and tying the mesentery before opening the bowel (Fig. 1).

The question of infection in an intestinal wound and the nutrition of the wound are closely allied. If the infection is slight and the nutrition good, the infection may be overcome. It is important to do away with infection as much as possible, and it is also important to have a good blood supply, but to cut the bowel too obliquely to obtain this blood supply may interfere with peristalsis. Disinfecting the intestinal ends before suturing should always be done, particularly in suturing the colon. It may be impossible to sterilize the mucosa, just as it is impossible to sterilize the skin by any known method which does not destroy the skin; but certainly the majority of the bacteria can be removed and then the needle and thread will not carry the infection they would if the fecal matter were simply squeezed out and no further effort made to clean the bowel end. Those cases of leakage opposite the mesenteric border in end-to-end union of the colon that some operators have noticed may be due to lack of cleaning the bowel ends with antiseptic solution and so preventing a mild infection where nutrition is weakest.

Kellogg[1] has pointed out the advisability of reproducing a valve like the ileocecal valve when the small intestine is united to the large. It has been the common experience that when a union is made without a provision of this kind the small bowel dilates or thickens. This is probably due partly to infection from the colon and partly to the back pressure of the gas in the large intestine. While, of course, such a valve cannot prevent the entrance of a small amount of bacterial flora from the colon, it may act as an ileocecal valve

[1] Surg., Gynec. and Obst., xvii, 563.

and protect the small bowel from an overwhelming amount of colonic fecal matter which would otherwise flood the small bowel with each retrograde peristaltic wave.

The operation here described was developed as a result of experimental and clinical experience, and is based upon the principles that have just been discussed. The steps of the operation are:

1. A thorough mobilization of the cecum, ascending colon and the lower part of the ileum by dividing the peritoneum to the outer side of the mesentery of the cecum and ascending colon.

2. Division of the mesentery which supplies the segment of bowel to be removed, taking care to keep as close to the bowel as the indication for the operation permits. The triangular surface at the mesenteric border of the bowel is clamped and tied and all of the mesenteric vessels are clamped and tied (Fig. 1).

3. The bowel which is to be resected is packed off by gauze wrung out of hot saline solution. Wet gauze should be carried under the loop as well as around the ends where the section is to be made. Then the diseased segment is clamped as close as possible to the point where it is to be cut and intestinal clamps are placed at a sufficient distance from this point on the healthy bowel so as not to interfere with suturing.

4. The bowel is divided with scissors, cutting somewhat obliquely to obtain better nutrition and from the mesenteric border outward.

5. The edges of the mucosa of the healthy end of the bowel are caught at three or four places with small forceps and the end of the bowel from the clamp to the cut surface is thoroughly cleaned with gauze sponges dipped in bichloride solution. After being cleaned of all fecal matter the excess of bichloride is mopped out and the end of the bowel is covered with a gauze pad wet in saline solution. Then the other end of the diseased loop of bowel is cut off and a similar procedure is gone through with.

6. Suturing is begun, using a straight needle and linen thread, and beginning on the mucosa of the colon. The needle is carried through the colon to the ileum and pierces the ileum about an inch from its end. The needle pierces the ileum from without inward and returns in a reverse direction through the ileum and colon. The thread is tied on the mucosa of the colon, making a mattress stitch. The short end of the thread is clamped with a hemostat (Fig. 2).

7. The suture is continued by carrying it back and forth after the manner of a continuous mattress stitch, taking more of the colon than of the ileum in each bite of the stitch and keeping an inch behind the end of the ileum.

8. After the mesenteric border has been passed the stitch is brought on to the surface by thrusting the needle through the colon and is then continued as a right angle stitch, penetrating all coats of the intestine, uniting the edge of the colon to the ileum an inch from its end, and taking more of the colon than the ileum in each bite. About every third stitch a back stitch is taken to prevent drawing the suture too tight. When the suturing has reached the point where it began, it is carried on the ileum one stitch beyond the short end of the thread, which was left clamped, and is then tied to the short end. The knot is tied in the line of the incision so it will sink well into the bowel. It is tied three times and cut short (Fig. 3).

9. A row of interrupted mattress stitches of fine tanned catgut is placed around the whole line of sutures. This is done to promote the valve formation and to add to the safety at the point of union. The mesentery is sutured together loosely and a piece of omentum, if it is in the neighborhood, is fastened over the line of union.

In resection of the colon the same technic can be used omitting, of course, the valve construction feature.

Only an inch of ileum is projected into the colon, because if there were more the eversion of the mucosa of the ileum would probably not be sufficient to cover the peritoneal

surface of the ileum which lies within the colon, and this excessive amount of peritoneal surface would be subjected to the irritating effect of the contents of the colon, and contraction might result.

After operations on the colon, gas is often annoying. A. J. Oschner has written fully of this complication.[1] On the left side it may be avoided by passing a tube from the anus through the intestinal union at the time of operation. On the right side, however, the tube would be too long and might exert injurious pressure at the flexures. I believe an enterostomy with a soft rubber catheter would be advisable. I have not yet done this in resection of the cecum and colon, but it could be easily performed and should add but little danger to the resection. The method of enterostomy I have used frequently in intestinal obstruction is based on the principle of Coffey of forming a valve of the mucosa and is shown by the illustrations. An incision about two inches long is made with a sharp knife down to the mucosa. A purse-string suture is placed at one end and the mucosa within the grasp of this suture is punctured (Fig. 4). A soft-rubber catheter is quickly inserted through the puncture, the purse-string suture tied snugly and an end of the suture is threaded in a needle and transfixes and holds the catheter in place. The portion of the catheter over the incision is then buried with a right-angled suture (Figs. 5 and 6). The catheter will stay in position at least five or six days and when removed there is little or no leakage of fecal contents. In connection with resection of the cecum and colon a catheter, with several perforations, could be introduced through a stab wound in the abdominal wall, placed in the colon near the resection in the manner described and carried through the intestinal union into the ileum. It should be so placed that at least one of its perforations would be in the colon while its tip rests in the ileum (Fig. 7).

[1] Jour. Am. Med. Assn., lxvii, 483.

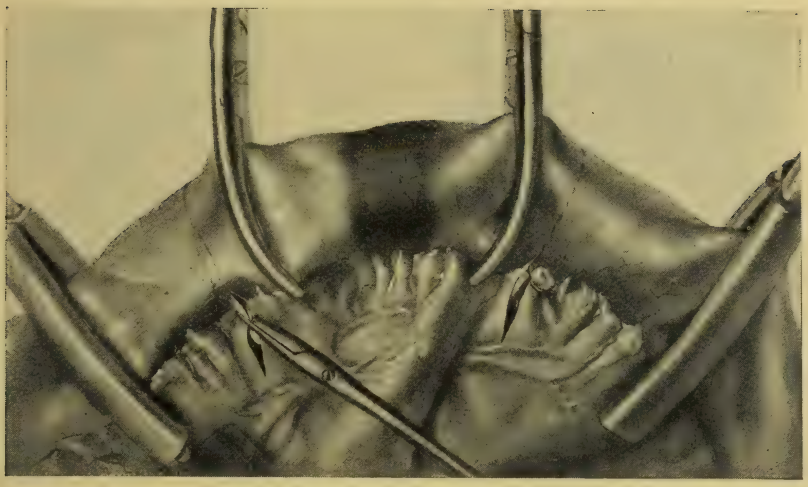


Fig. 1.—Before the bowel is divided, its mesentery is cut close to the bowel wall and the triangular space, caused by separation of the layers of the mesentery just before they cover the bowel, is clamped with a hemostat and ligated with silk or linen. This area is composed of areolar tissue rich in bloodvessels and lymphatics which absorb quickly, and even though it is closed after it has been inoculated, the germs are merely sealed in and are likely to cause breaking down of the union at this point later on. The procedure indicated here obviates this and also brings together the peritoneum at this point.

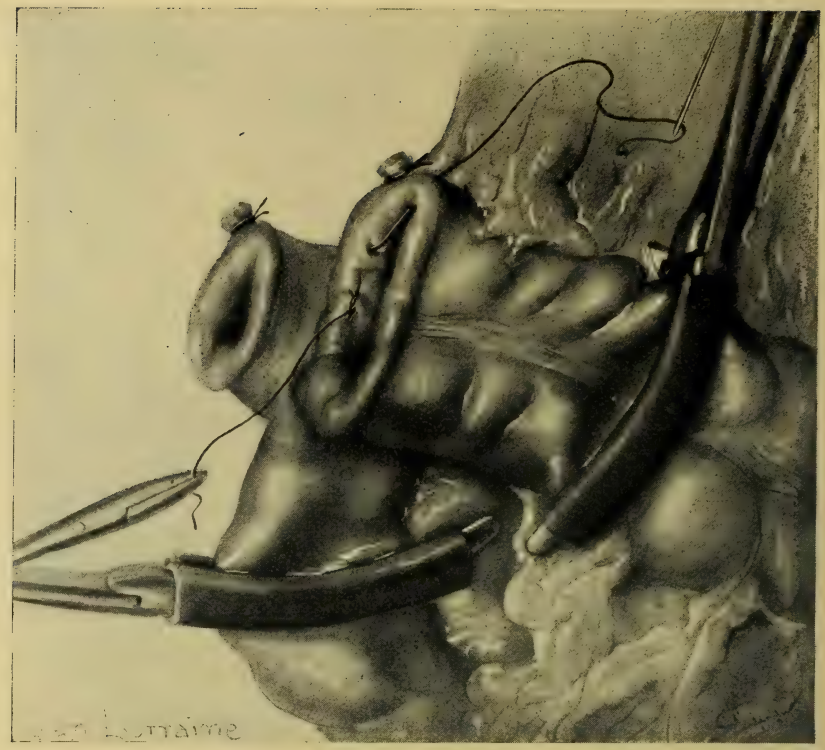


Fig. 2.—The bowel ends have been cleaned with sponges dipped in antiseptic solution and the suturing has begun. A straight needle and linen thread is used, and, starting on the mucosa of the colon, the needle is carried through the colon to the ileum, pierces the ileum about an inch from its end, and returns in a reverse direction. The thread is tied, making a mattress stitch, and the short end of the thread is clamped with a hemostat. The suture is continued as a continuous mattress stitch.

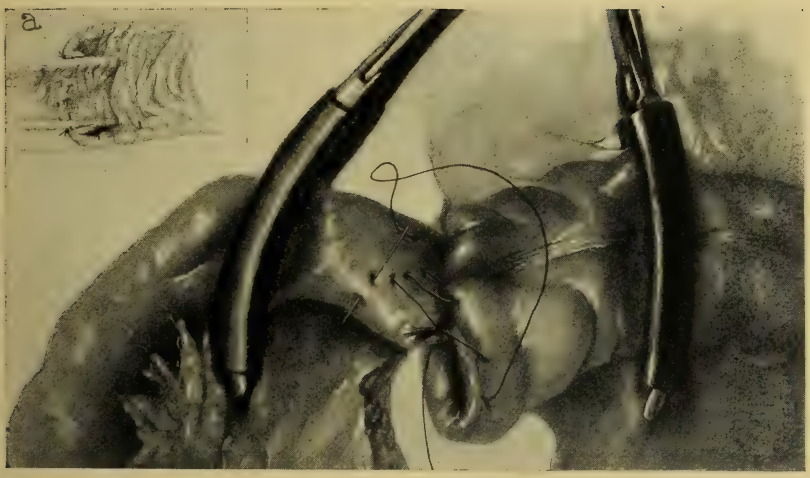


Fig. 3.—After the mesenteric border has been passed, the needle is brought onto the surface by thrusting it through the colon and suturing is continued as a right-angle stitch, penetrating all coats of the intestine, uniting the edge of the colon to the ileum about an inch from its end, and taking more of the colon than the ileum in each bite. About every third stitch a back stitch is taken to prevent the stitches from being drawn too tight. It is finished by tying to the original short end that was left clamped.

Insert "A" shows section of the bowel after completion of the operation and insertion of interrupted catgut mattress stitches.

Fig. 4.—In an enterostomy the incision is made through the peritoneal and muscular coats down to the submucosa. At one end of the incision a purse-string suture is inserted.

Fig. 5.—The mucosa within the grasp of the purse-string suture is punctured and a catheter is quickly inserted, the purse-string suture being tied snugly about the catheter. One end of the purse-string suture is threaded in a sharp needle and fixes the catheter in position. The portion of the catheter that lies on the incision is buried by a right-angle stitch.

Fig. 6.—The enterostomy has been completed. Usually there is no leaking of the fecal matter when the catheter is withdrawn, due to the valve formation of the mucosa. (Coffey.)

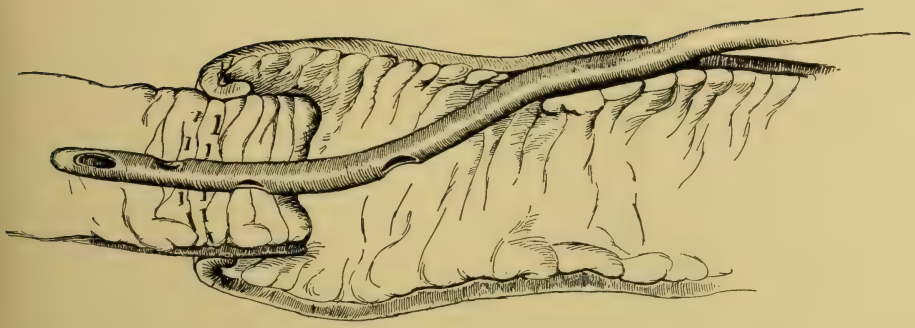


Fig. 7.—Section shows the union of the ileum and colon complete with the enterostomy tube in position. Note the oblique manner in which the tube is introduced.

Fig. 8.—Hypertrophic tuberculosis of the cecum. Drawing of a transverse section of specimen removed from Mrs. D.

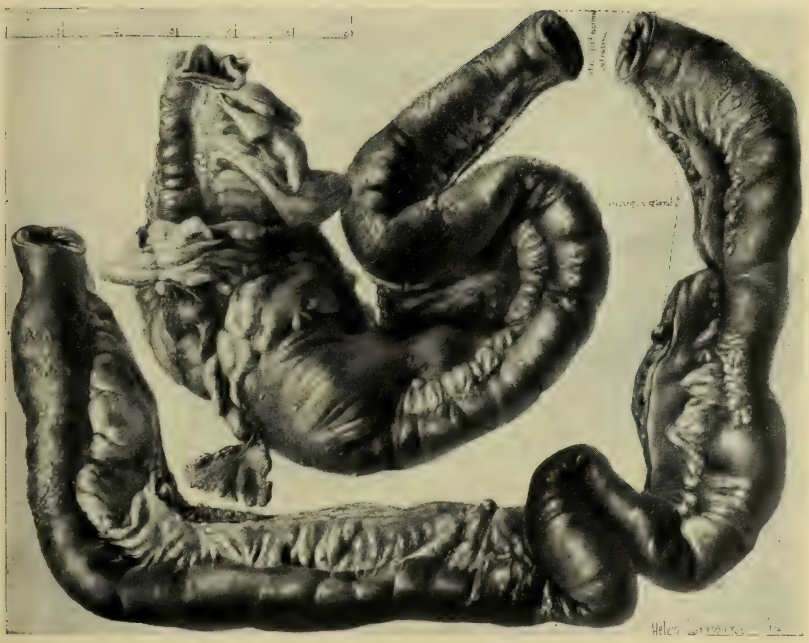


Fig. 9.—Drawing of the exterior of specimen removed from Mrs. D. Note the portions of the ileum that are covered with tubercles and the marked contraction of the ileum at one point. There was no evidence of any other tuberculosis in the abdominal cavity. After resecting that portion of the intestine including the cecum and ascending colon, a separate resection was made of the segment of diseased ileum.

Fig. 10.—Photomicrograph (× 85) of section of one of nodules of the specimen shown in Fig. 9, showing giant cells and other typical histologic structure of a tubercle.

The series of seven cases of resection of the cecum and ascending colon herewith reported comprise all the operations of this kind that I have done since January 1, 1908. In all of them the principles of end-to-end union, ligation of the triangular space on the mesenteric border of the bowel before opening the bowel and cleaning out the ends of the bowel before suturing were carried out, though in only the last case was a valve formed as described. In one case, the Barber operation was performed[1] transplanting the ileocecal valve. All of the patients recovered from the operations satisfactorily. An enterostomy was not done in any of these cases, though I believe in at least two convalescence would have been more comfortable had it been used. I will add this to the technic in the future.

The last patient, Mrs. G., operated on September 14, 1917, had marked intestinal stasis and thickening of the cecum and ascending colon and the technic was carried out as described, including the valve formation. This patient, aged fifty-five years, had been an invalid for years, having been confined to bed most of the time for a year and a half previous to operation. She had been treated by a number of very competent physicians in other hospitals and at her home with only slight and temporary benefit. When she entered the hospital for operation she weighed 82 pounds. She began gaining weight about two weeks after operation and within five months gained 36 pounds. She now weighs 115 pounds and is doing her own housework for a family of two (November 1918). She still has a few nervous symptoms, though they are comparatively insignificant.

Two of the resections were done for intussusception in infants (aged nine and ten months respectively). In one it was impossible to reduce the intussusception; in the other after it was reduced with considerable difficulty the bowel was so damaged that it was thought unwise to leave it. Two

[1] Interstate Med. Jour., 1917, No. 1, xxiv.

of the resections were for stasis in cases in which medical treatment and in one instance two previous operations had failed to give relief. One of these cases, Mrs. G., has been mentioned. In the other, Mrs. M., aged fifty-two years, the Barber operation was done and there was marked improvement, though not so great as in the case of Mrs. G. In three cases (aged fifty-seven years, twenty-eight years, and sixteen years respectively) resection was done for hypertrophic tuberculosis of the cecum. One of these patients has been reported in connection with another group of cases.[1] In all three the pathological findings were quite similar. In one, Mrs. D., aged fifty-seven years, it was thought that the growth was cancerous, but gross section and microscopic examination showed typical features of hypertrophic tuberculosis. There was also tuberculosis of several loops of small bowel which were removed. The end of the ileum was united to the colon and then the other affected portion of the ileum was resected (Figs. 8, 9 and 10).

NOTE.—Since this paper was written I have resected the cecum and ascending colon in another patient, making a total of eight cases of this kind in which this operation has been done. The valve formation and the enterostomy were carried out as described. The patient made an entirely satisfactory recovery; her pulse did not go above 104, and there was no distention. J. S. H.

[1] Tr. Southern Surg. Assn., xxi, 212.

PRACTICAL PERMANENT COLOSTOMIES

By W. E. Sistrunk, M.D.
Rochester, Minn.

Each year we see a number of patients in whom we find it necessary to make permanent colostomies. As a rule, these colostomies are made in certain patients selected from a group of cases in which it has been found necessary to excise the rectum and sphincter muscles for cancer, and in cases of inoperable cancer of the rectum. The patients thus operated on have given us excellent opportunities to test the various types of operations and to note the annoying conditions which may arise following a permanent colostomy.

In reviewing briefly the anatomy of the lower colon, it will be remembered that the posterior one-third of the descending colon from the splenic flexure to the sigmoid, usually lies behind the peritoneum. This portion of the bowel has, as a rule, a very short mesentery, and often is more or less fixed to the posterior abdominal wall. Near the beginning of the sigmoid flexure the peritoneum completely surrounds the bowel and the mesentery supplying this portion becomes much longer; it usually measures from three to six inches in length.

Nearly every type of colostomy that has been suggested and that seemed practical has been used in the Mayo Clinic, but up to the present time, operations or procedures undertaken with an idea of giving the patient control of the bowel passages have almost always proved disappointing. Until recently we made the majority of colostomies through an

oblique, muscle-splitting incision in the left inguinal region. The loop of bowel brought up for the colostomy was supported by a glass rod, a rubber tube, a piece of skin or silk-worm sutures, and was cut across five or six days following the operation. Many of the colostomies made in this manner were perfectly satisfactory. In a few of the cases there was a tendency toward the development of a ventral hernia into the tissues surrounding the colostomy. More frequently, however, the tendency has been toward a retraction of the loop of bowel in which the colostomy was made, allowing, in some instances, the proximal end of the bowel to discharge a part of its contents into the distal end. We also have found, in instances in which the bowel was cut off at or near the level of the skin, that there is a tendency on the part of the skin to contract around the opening in the bowel, thus narrowing it sufficiently to interfere with the proper discharge of feces. In looking back on the group of colostomies made in this manner it is easy to explain the reasons for the development of most of these conditions. The incision was made over a portion of the bowel which was more or less fixed and if the sigmoid flexure was used as a loop for the colostomy this was often elevated with considerable difficulty. After the colostomy had been made, the edges of the abdominal wall were separated for a distance of from two to three inches by two limbs of bowel and the mesentery supplying the loop used for the colostomy. This, naturally, left a large opening through the abdominal wall which in some instances permitted a herniation of the loop; or allowed the loop to retract or pull inward toward the abdominal cavity.

In many of the operations for excision of the rectum a segment of the sigmoid is left between the colostomy and the site where the bowel is cut off in making the excision of the rectum. In such instances, if the colostomy retracts sufficiently to permit the distal end to empty its contents into the segment, the feces gradually accumulate and produce a large painful tumor. Occasionally we have found it neces-

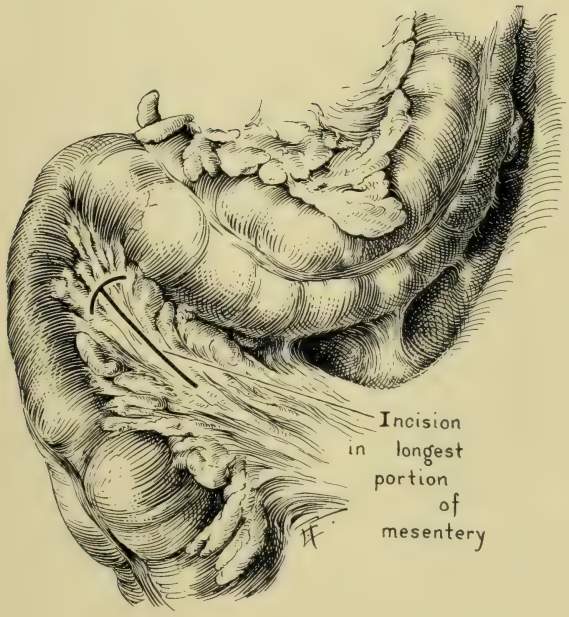


Fig. 1.—Near view of sigmoid flexure, showing the long mesentery in comparison with the short mesentery above it, and also the incision in the mesentery when the sigmoid flexure is used for making a colostomy

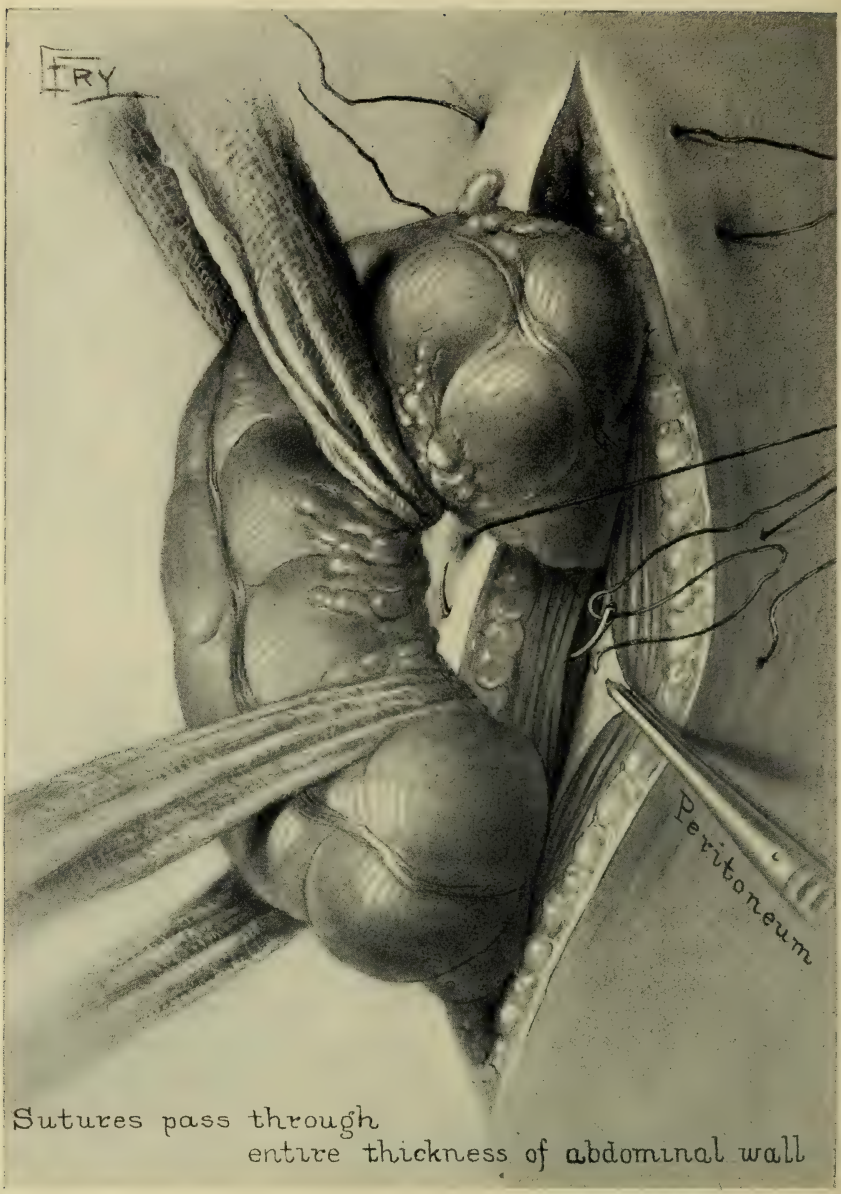


Fig. 2.—Edges of the opening in the mesentery of the sigmoid being held widely apart by gauze while a portion of abdominal wall is being closed through the opening.

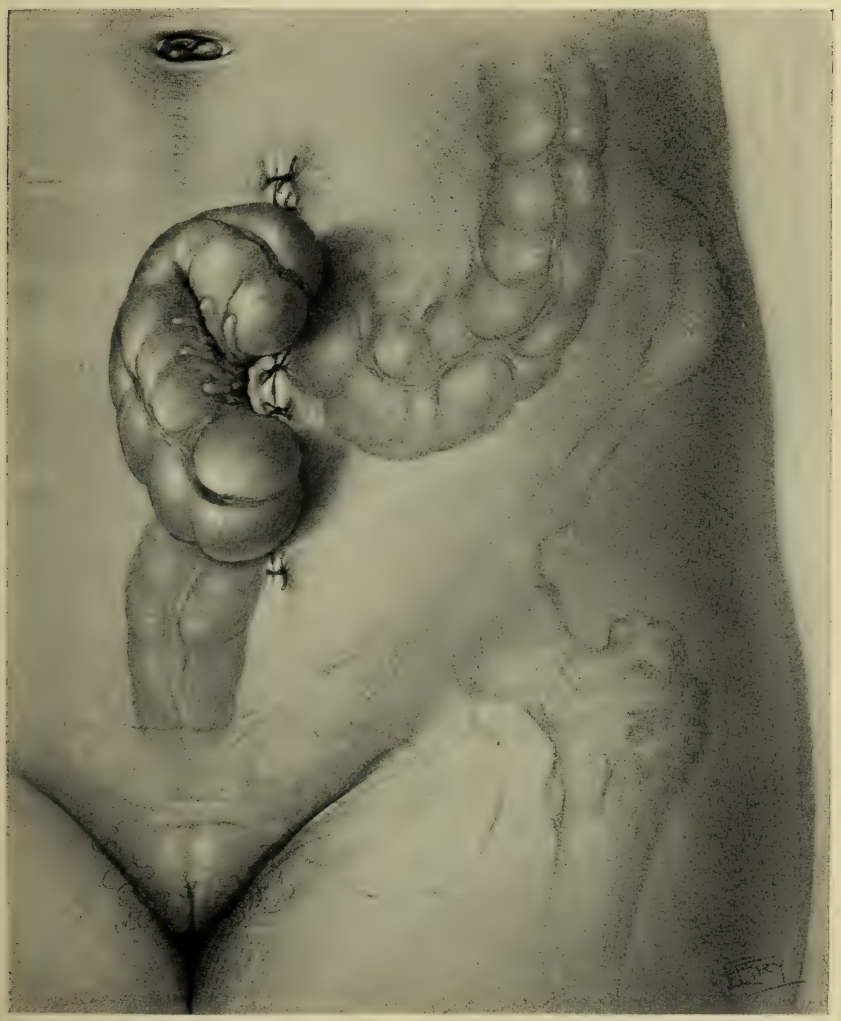


Fig. 3.—Unopened loop of bowel brought out for colostomy after the abdominal incision has been completely closed.

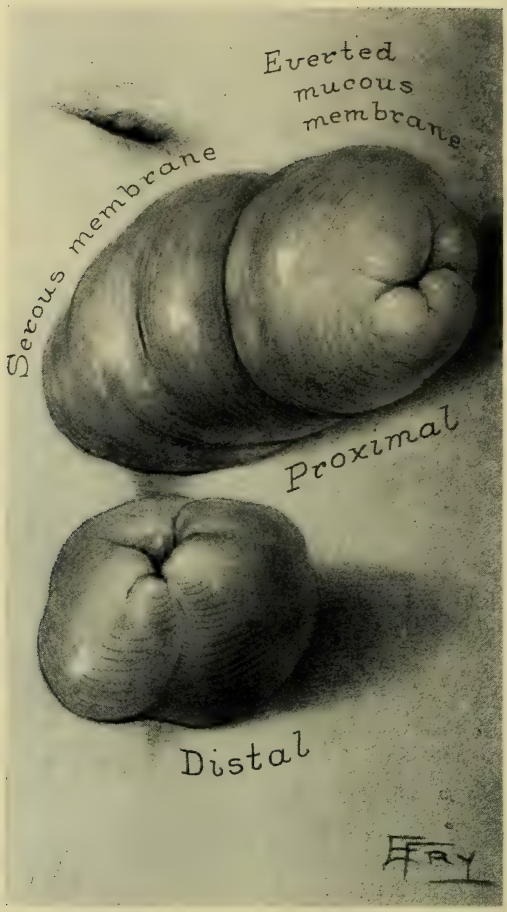


Fig. 4.—Ends of the bowel after it has been completely cut across.

sary, either to remove this segment or to empty it and perform a plastic operation which will more widely separate the ends of bowel.

We are now making a colostomy very similar in type to the one described by Mixter. As a rule this colostomy is made through a straight incision placed below and about one inch to the left of the umbilicus.

An incision of this type possesses distinct advantages. Through it a thorough exploration of the abdominal cavity may be made. If it is found necessary, a primary resection of the bowel is possible, or, the first stage of the three-stage Mikulicz operation can be done. The incision may be extended in either direction, and if, after the exploration, it is decided to make a colostomy, this is made through the center or upper end of the incision.

Operation. The colostomy is made in a loop of the sigmoid flexure; this portion of the bowel is chosen because of its extreme mobility and the length of its mesentery. After the loop has been lifted out of the abdominal cavity, an incision from one and one-half to two inches in length is made through its mesentery, parallel to the direction of the blood-vessels, and extending upward nearly to the bowel. A second incision, about one inch long, is then made across the end of the first incision quite near the mesenteric attachment of the bowel. Two strips of gauze are placed in the upper end of this T incision and when these are pulled apart a good sized opening through the mesentery is created. The two sides of the entire abdominal wall near the center of the abdominal incision are sutured through this opening in the mesentery. The remaining portions of the incision are then closed; a small bit of the bowel is included in two of the sutures to prevent the possibility of herniation of a loop of small intestine. When the gauze has been removed a glass rod or rubber tube is placed through the opening in the mesentery between the skin and bowel to serve later as a guide in cutting across the bowel (Figs. 1, 2, 3 and 4).

If necessary for gas distention, a small opening may be made in the bowel any time after twenty-four to forty-eight hours, and in from five to six days the bowel is cut across completely with the cautery. As a rule, however, the patients pass gases very readily through the knuckle which has been brought up, and it is unnecessary to disturb it before five or six days. After the loop has been cut across it will be found that the two ends of bowel are separated by the entire abdominal wall for a distance of from one to one and one-half inches and that the cut ends of bowel protrude for a distance of an inch or two above the skin. These may later be cut shorter if thought necessary.

The advantages of an operation of this type can be readily seen. In our hands it has obviated some of the difficulties which have often followed other types of colostomies.

DISCUSSION ON THE PAPERS OF DRS. BLACK, HORSLEY AND SISTRUNK

Dr. Joseph C. Bloodgood, Baltimore, Md.—As we are limited to five minutes, I would like to discuss Dr. Horsley's paper on resection of the colon with end-to-end anastomosis. If Dr. Horsley can devise a safe end-to-end anastomosis of the cut ends of the colon or end-to-end anastomosis between the small and large intestine, he will make a great contribution to surgery.

I remember beginning my intestinal suture work on dogs as a student in the University of Pennsylvania in 1886; and in recent years I have had the opportunity of resecting the small and large intestines and anastomosing them in a great many cases. The first end-to-end anastomisis I did with the small intestine was for gangrene in a strangulated hernia; it was done with the Halsted bag, and perhaps some of you do not know of that bag. It was really a helpful method. It is somewhat like a sausage with a tube, and you can introduce it into the ends of the intestine that have been cut and then blow it up and make a suture. Dr. Halsted devised it in 1896 or 1897. That was the first resec-

tion of the small intestine for strangulated hernia in the Johns Hopkins Hospital and of end-to-end suture; and I naturally felt that it was the method to employ later. But I tell you, frankly, it is the only end-to-end suture I have ever performed for the small intestine. My experience with this method and familiarity with the literature led me to believe that theoretically it was correct, yet the chances of leakage were so great that it was not as safe as lateral anatomosis. There is no question theoretically that end-to-end anastomisis should be better than lateral. My first lateral anastomosis was done in 1900. I have done a great many since. This patient on whom an end-to-end anastomosis was made is still living. He is a surgical orderly, and many other patients on whom I did a lateral anastomosis are living. The operation was done on one patient eighteen years ago, and he is still living. Of course, I speak from memory now, but I do not remember a single lateral anastomosis of the small intestine that I have done that gave any trouble. They may be theoretically incorrect; nevertheless, they have been practically successful.

The danger of end-to-end anastomosis I believe is not one of infection. I may be incorrect, but it is one of circulation. It is not difficult to suture in any anastomosis, but it is difficult, no matter how you divide the gut, especially the large gut, to preserve the circulation of the cut ends, so that the circulation will be sufficient to allow inflammatory reaction.

My experience has led me to conclude that there is no objecttion to lateral anastomosis of the small intestine, and I have made it both ways with the ends overlapping in this way (indicating on blackboard) or the two ends pointing in this direction (indicating), and the results are identical. You think this would give trouble later. I have seen about four cases at reoperation for some other reason. The reason that we need a safe end-to-end anastomosis for the large intestine is that sometimes, when we resect a portion of the transverse colon, it is very difficult to bring the ends together for lapping. Of course, cancer of the transverse colon is very rare as compared to the left side. If one will go over the literature of resection of the transverse colon for cancer, he will find a larger proportion of deaths from leakage than from any other part of the gut, so that we need a safe method. I have performed end-to-end anastomosis for cancer of the transverse colon once only, and I was so fearful of the safety of the future that it would leak, due to necrosis, I made

the suture practically extraperitoneal. I did not put in gauze, but I left the wound partially open so that if it leaked, it would do so externally. It did leak following extraperitoneal suture. However, the patient recovered and was still living five or six years after the operation. We need a safe method of end-to-end anastomosis, and I trust Dr. Horsley has made it safe by resecting the lower segments of the colon. Perhaps the surgery, especially the mechanical part, of the lower sigmoid and upper rectum, where we can remove the disease successfully with sufficient margin, is the simplest part of the operation; but the restoration of the continuity of the bowel in that region is the most difficult of all the surgery of the colon and safe end-to-end anastomosis is one to be desired.

I have been over my cases very carefully and I do not know of any perforations or of any deaths from peritonitis in this group of lateral anastomosis of the small intestine. When a resection of the right colon has been done for cancer there have been no complications after operation excepting when the patients have died of cancer due to recurrence or metastasis.

It is very difficult to explain in the next group of cases where the right colon has been resected, not for cancer, but for conditions that some of us do not resect so often for now as we did in the past (one may call it ptosis), why the same method of anastomosis does not give the same results. The chief complication is a diverticulum. I have had diverticula of this portion (indicating) by this method of anastomosis, and this is the only method in which, so far, there has been no diverticulum. That is all I can say about the difference between lateral and end-to-end anastomosis.

I trust Dr. Horsley can demonstrate by actual results upon the human being that end-to-end anastomosis is as safe as lateral; but in my experience, when lateral anastomosis is possible, it is the safest method I know of and is not accompanied by complications. There are places in the transverse colon and in the lower sigmoid where end-to-end anastomosis is practically the only method, and I sincerely trust that Dr. Horsley's method will prove to be as successful as lateral anastomosis. I warn you, however, about using end-to-end anastomosis unless you are certain about it.

Dr. Francis Reder, St. Louis, Mo.—I wish to apologize to the members of the Association for referring briefly to an incident

that Dr. Bloodgood has just related. It is with much feeling that I speak of it. I have reference to the oblong rubber bag that Dr. Bloodgood mentioned. The idea of introducing an oblong rubber bag into the lumen of the bowel for the purpose of anastomosis originated with me in 1892. It was a matter of great encouragement to me when Dr. Halsted also devised a rubber bag for a similar purpose. The rubber bag for intestinal anastomosis is responsible for a very happy correspondence between Dr. Halsted and myself.

With reference to anastomosing the small intestine with the large bowel, I rather feel inclined to shun an end-to-end junction. My preference is given to lateral anastomosis, leaving a vent by draining the open end of the small intestine through an opening in the abdominal wall. The greatest danger in bowel anastomosis is gas distention, which may cause a tearing out of the suture and leakage. If the gas can find an exit, such as a vent of this character can give, no such disaster will take place. I feel very grateful to Dr. Ochsner for having spoken so favorably about this operative measure. It has proved a very happy method in my hands. Of the last eight cases of small to large bowel anastomosis, no fatality occurred.

Dr. Samuel J. Mixter, Boston, Mass.—I wish to speak briefly on the paper of Dr. Sistrunk regarding colostomy. This subject has always interested me because, though colostomies are beastly operations, if any patient wants it done he or she wants to be made as comfortable as possible with a permanent artificial anus.

The primary point in the making of an artificial anus is to get it at the center of motion, which is near the umbilicus. The nearer one can get the artificial anus to the umbilicus the less trouble it will give, and the apparatus can be held there. If it is down near the groin, every motion the patient makes in sitting or standing moves the apparatus and the thing leaks, and it is disgusting. The important point then is to make this as near the umbilicus as possible. One should go through muscle, and if the writer of the paper will pardon me, I will add a little frill to the method he uses. The incision, instead of being straight through the skin and rectus sheath, should be made in the manner shown in Binnie's *Operative Surgery* (7th edition, p. 450–453). The rectangular flap should be made a little nearer the umbilicus than is figured. The rectus muscle and its posterior

sheath is sutured through the opening in the sigmoid mesentery and the flap of skin and fascia is sewed in place as figured. If an immediate opening is necessary, make it as near the lower part of the exposed intestine as possible. In dressing the wound, cover the exposed intestine with rubber tissue so that the gauze may not stick. Do not remove the loop of intestine as figured in Binnie, but cut if off at the lower end, leaving the hose-like piece of intestine projecting. The lower end of this piece may slough a little from lack of nutrition, but it can be trimmed up later. If this hose of intestine could be covered with skin it would be of great advantage, as a long piece of intestine outside enables an apparatus to be used much more effectually. I have tried skin grafting without success, and have even used a prepuce to cover it, also without success. As the wound cicatrizes the mucous membrane rolls out and the cut edge gradually approaches the skin, leaving a large rosette with the opening in the middle. This might seem a disadvantage, but it is not. The further the opening is from the skin the better, as the feces naturally fall into the bag without running down along the skin. I have a number of patients on whom this operation has been done for malignant disease who are living comfortable lives. They have a bowel movement every day which gives little trouble, and there is very little leakage except of gas, and the patient has a fairly comfortable life.

Dr. Charles A. L. Reed, Cincinnati, Ohio.—I have been very much interested in these papers, especially in the one by Dr. Horsley, and especially in one or two statements contained in his paper. The doctor has repeated a statement that we hear quite frequently in these later days, namely, that ileosigmoidostomy is a failure, although I believe he did not mention it in precisely those terms. Ileosigmoidostomy is not a failure. There are too many unqualified successes from it in my own practice and in the practice of others to justify any other conclusion.

The doctor has spoken of the desirability of an end-to-end anastomosis with a right colonectomy. I use the word colonectomy and not colectomy, because I remove the colon and not the neck. Right colonectomy has given a sort of reactionary movement against total colonectomy as originally proposed and practised by Lane. It is easier surgery, not especially difficult, and there is a larger percentage of primary recoveries, and it looked, when first promulgated, rather logical, especially with

the end-to-end anastomosis, and especially when that anastomosis was so effected as to secure a valve-like formation at the point of union. But sometimes we get another view of the subject in retrospect, and that happened to be my experience. The operation is generally done for stasis, a condition which when it depends upon otherwise uncurable ptosis imperatively demands operative correction.

We have here the colon (illustrating on blackboard). An *x*-ray picture shows a heavy retardation at eight hours at this point (indicating the terminal ileum and cecum) and at twelve or eighteen hours at this point (indicating the hepatic flexure). The next station at which the process stops is here (indicating the loop of the festooned colon) and the next one is at this point (indicating the splenic flexure). You are proposing to correct that condition by a right-sided resection and you are encountering a mechanical condition which involves the retardation of the fecal current primarily at the ileocecal juncture; next, the hepatic flexure; next, at the midcolonic angulation, and next at the splenic flexure. Your process involves cutting off the ileum at this point (six inches from the ileocecal valve) and cutting off the colon generally about four inches beyond the hepatic flexure. In other words, you cut off this part of the colon (indicating) and it disappears from the picture (erasing). Now, what are you going to do? You have the end of the ileum running up hill and you are proposng to do, what? You are proposing to bring it up here (indicating) and you are making this end-to-end anastomosis between the ileum and the colon here, which is better done by the button than it is by any other means, and here is the relative anatomical position when you get through. You are imposing an unnatural load upon the peristalsis of the small intestine by expecting it to work against gravity; you are establishing a cicatricial ring with a contractile tendency; and you still leave of the original condition, the retardative angulation in the middle of the transverse colon and at the splenic flexure. In other words, you have not corrected, much less removed, a good 50 per cent. of the pathology in the intestine itself. But there is a most important part of the pathology that you have not touched at all. I allude to the impounded venous circulation of the mesentery, and you have not relieved it because you have not in the least removed the causative condition, namely, the ptosis of the remaining bowel. So with an up-hill fecal current in the ileum, with no valve to

protect the ileum from reflex fecal pressure, with remaining retardative angulation in the colon, with remaining ptosis and remaining circulatory stasis, you will see that you have not only done very little to keep your patient, but that you have laid the foundation for even more serious trouble. I did a few of these cases, but was glad enough to have an opportunity of subsequently correcting the condition by doing the vastly more logical ileosigmoidostomy to establish a normal fecal current and at the same time do a parietal implantation of the colon to overcome the ptosis and restore the mesenteric circulation.

If one is going to do a right-side colonectomy with an end-to-end anastomosis by all means manage to make a valve at the point of union. There is no particular difficulty about the mechanics of this particular species of plumbing; it can be done very readily. It is important, however, to take precautions to maintain the patulousness of this connection during the time of primary recovery. There is nothing which will subserve this purpose so well as the button which holds the lumen open and the approximated edges together; and thus, while resisting the tendency to occlusion from inflammatory engorgement and while not interfering with primary recovery, it will result in the formation of a valve that will be a safeguard against fecal reflex.

As to ileosigmoidostomy, we are hearing a good deal about this ballooning that forms in the end of the small intestine, and there is good reason for it considering the manner in which the operation is ordinarily done. You have here the sigmoid (indicating), and the usual method of procedure, as I have seen it done, is to cut off the ileum, and after cutting it off, then close the end, then bring it down here (indicating) and make a side-to-side anastomosis, with what result? You, of course, have a ballooning at this point with the necessity for a secondary operation to relieve the new condition. The way to avoid that is to make a two-inch side-to-side anastomosis with the ileum still intact as the primary step; then, after you have done that, simply put a snap forceps across here (indicating) and another one here (indicating) and cut the ileum off. Then you close the proximal end of the ileum with an infolding suture so close up to the anastomosis that the infolded end goes into the anastomotic orifice. It will hold the orifice open so you will not need a rectal tube; it will give you a large orifice, and when you are all through there will be no ballooning.

It is well to remember that in many of these cases the small

intestines are ptotic—a condition of real enteroptosis—and that this condition is not relieved by what is done to the colon. In these cases the very best thing so far devised is ileosigmoidostomy, with the formation of an actual and effective valve at the colosigmoidal juncture. One can do this operation in a lot of these cases that seem to require actual colonectomy. I have found it desirable to do a two-stage operation. When I do a two-stage operation I cut off the sigmoid at this point (indicating the colosigmoidal juncture), infold it and close it; then the upper end of this descending colon is brought out through the wound and drained. I supplement that with an appendicostomy or cecostomy or an ileostomy and drain this colon and put it in physiological disuse for months. When the patient comes back for secondary operation he has a colon the size of the little finger with a corresponding atrophy of the bloodvessels and nerves with the further result that the whole thing is readily and safely safely dealt with. If diseased I take it out, or having put the patient in good condition, I reëstablish the continuity of the bowel at this point (indicating colosigmoidal juncture) with a valve-like formation. After this the colon will continue to drain down through the rectum, but will remain in physiological disuse. I often leave the perfectly innocuous ileal or appendicular orifice open indefinitely and use it occasionally to irrigate the now diseased colon and thus hasten its physiological atrophy.

Dr. W. E. Sistrunk, Rochester, Minn.—In regard to Dr. Horsley's paper on intestinal suturing and end-to-end anastomosis, I think it has been proved definitely that it is perfectly practical to do end-to-end anastomoses in human beings, and in the work which we do at Rochester at the Mayo Clinic it is a routine with us to make end-to-end anastomoses in practically every resection we do. About the only instance where we do other than an end-to-end anastomosis is sometimes in resections of the right colon, when we do an end-to-side anastomosis between the ileum and the cut-off end of the transverse colon; but in every other resection I can remember we have done end-to-end anastomosis.

Dr. Charles M. Rosser, Dallas, Texas.—I was unprepared to understand the mortality rate which Dr. Reder has encountered in suture of the intestines by end-to-end anastomosis. I am familiar with the fact that lateral anastomosis is less difficult. The secret of success in either case is free approximation

of the serous coats by a suture tight enough to control against leaks and loose enough to avoid necrosis. I have practised the end-to-end method exclusively for several years without disappointment. I report a successful case which certainly presented all the difficulties possible. Mrs. F., aged forty years, came to the hospital *in extremis,* due to pelvic abscess of subacute character. A complete perineal tear had existed fifteen years. This obviated a dilatation of the rectum and sigmoid rectum, with consequent thinning and narrowing of those structures. Due to its massing with a perforated tube and its unexpected small size, by accident I severed the sigmoid rectum, which was proved by passing a rectal tube. Suture was done, but owing to the present infection, union failed and a fecal fistula persisted until a secondary operation four months later, when the patient's general health was good.

The gut as stated was divided very close to its disappearance from the pelvis. The lower part to be reunited was so short that it was necessary to lift the uterus to see it and therefore the anastomosis was necessarily to be made *in situ.* No paring of end surfaces was performed. The approximation was by chromic catgut, which enfolded the peritoneal coats as freely as possible, a rectal tube having been passed through both segments to remain several days. Drainage was provided but found to be unnecessary. Recovery was prompt and continuous.

Dr. W. B. Coley, New York City.—After what Dr. Bloodgood and Dr. Reder have said, I would like to refer to some of the older methods of resection and go back to the rubber bag which has been mentioned. I have used the Murphy button, and also have done lateral and end-to-end anastomosis. About fifteen years ago I had a physician come to me from Canada with a carcinoma of the cecum which had involved a considerable portion of the wall of the cecum; there were also adhesions and involvement by contiguity of a loop of the small intestine. This case was explored in Canada and closed up as inoperable. I resected the cecum, a part of the ascending colon, and about six inches of the adherent and involved loop of small intestine, did a double resection, and made an end-to-end anastomosis of the small intestine with a small Murphy button. I made use of the oblong button with the large intestine, which was united with the ileum by lateral anastomosis. This man made an excellent recovery, lived two years and died of general carcinomatosis.

In one case I resected the small intestine in a patient, a boy, aged fourteen years, for a fecal fistula high up following an operation six months before for intestinal obstruction. I resected about a foot, did an end-to-end anastomosis by the Murphy button and he made a good recovery.

Another case of strangulated hernia was treated by the injection method. Later the intestine was put back and the patient developed gradually increasing difficulties, and finally there was complete obstruction. I found a large mass of small intestine, all bound together, representing more than four feet of small intestine. I resected this mass, made an end-to-end anastomosis with the Murphy button and the patient made a good recovery. In another case of cancer of the transverse colon I did an end-to-end resection, united the two ends and the patient made a good recovery. These cases show, I think, that the Murphy button may still have value in selected cases.

Dr. W. P. Carr, Washington, D. C.—I never did a lateral anastomosis because I have been satisfied with end-to-end anastomosis of the small intestine. I have never done a lateral anastomosis in the large intestine. It seems to me that all the objections to an end-to-end anastomosis in this part of the bowel can be very readily overcome by the method of Dr. Horsley, just explained, by closing the triangular space in the mesentery before you open the bowel, and separating the mesenteric portion we are going to resect before we open the bowel. We can also overcome in this portion of the bowel the danger of gas forming by passing a rectal tube and leaving it for a few days.

The next point is I have always used the shoemaker stitch for the first suture and have reënforced that with a fine catgut Lembert suture. This shoemaker stitch in my judgment is almost a perfect preventive for leakage unless, as Dr. Bloodgood has said, you have interference with the blood supply near the end of the bowel where it is cut. You can overcome that by infolding a large amount of bowel. If you make a cut through the bowel you interfere with the circulation for half an inch, but it is important in the large intestine to turn in a half inch, and in that way, if there is any sloughing, it will be inside the bowel and not cause leakage. If you turn in half an inch of the bowel and do it with a shoemaker's stitch, you never have any bleeding or leakage. You can provide for any gas formation by passing a rubber rectal tube up through the place of anastomosis,

so that it will drain gas from above as well as below the point of anastomosis.

Dr. Major G. Seelig, St. Louis, Mo.—I should like to ask Dr. Horsley to tell us the technic or the improved points in the technic with which he safeguards his end-to-end procedure in suturing that part of the large intestine which is practically a retroperitoneal organ. My own practical experience is that the type of anastomosis in the small intestine is really of immaterial consequence. Neither the diaphragm of the end-to-end nor the diverticulum nor the bulging formation laterally seems to have manifested any difficulties that show themselves clinically after anastomosis. I have always done the lateral anastomosis in the large bowel, for the reason that I have feared leakage at the unprotected border of the gut. That is one essential point in the large majority of colons. I have not heard it mentioned either in the paper or discussion, and it would be quite interesting to have Dr. Horsley devote a few minutes to that feature.

Dr. John T. Moore, Houston, Texas.—This discussion has tended to run along the line of lateral and end-to-end anastomosis, and I am tempted to present a case I operated upon in August of this year. The patient was a doctor's wife, who had been operated upon ten years before. She had had the small intestine resected and a side-to-side anastomosis made. She came down to Houston from San Antonio to see me and I found her in a very wretched condition. She was very anemic. I think her hemoglobin was between 35 and 40; she was quite thin and vomited everything she ate. We could do nothing for her at the time. We put her to bed, watched her, had *x*-ray studies made and found she had a definite obstruction, with some evidences of a soft tumor in this region that could not be outlined particularly well. It was more like a soft cyst. Upon opening the abdomen we found a largely dilated blind end of the gut the size of a small cocoanut. If you take this as the ordinary lateral anastomosis, we found at the point of obstruction at this point (indicating) this blind end growing into a tumor as large as a cocoanut. I have the specimen in my collection, which is the largest of its kind I have ever seen. The intestine from the stomach on down to the point of obstruction was hypertrophied until it was as thick as the ordinary stomach wall, and the gut below was very much collapsed. We took this end for our

section and resected at this point (indicating), removing this, then closed the point here by the side of the old anastomosis by folding it in and did an end-to-end anastomosis by the ordinary suture method that has been presented so well by Dr. Horsley. Since the last operation the woman has gained forty-two pounds and looks the picture of health. She has had no trouble of any kind since.

One other case I will briefly relate: A man had had a lateral anastomosis made in Kansas City; he had been in the army service, and while at Camp Logan, which was located in our vicinity, he came to us with obstruction. He had this obstruction from a partial dilatation at the extremities with a rotation of the gut. In turning over it made a complete obstruction. He was in such an extreme condition that we only straightened this up and anchored it, as it were, to prevent subsequent rotation because we were not willing to risk doing a resection.

I was a little surprised at what Dr. Bloodgood said with reference to end-to-end anastomosis, because I have ventured to say in our local medical society that I felt, with the advance in intestinal surgery, it was a great mistake for anybody to do a lateral anastomosis on the small gut. I have had such respect for Dr. Bloodgood's opinion along all surgical lines that I felt a little surprised when I heard him say what he did.

Dr. Horsley (closing).—Referring to the remarks by Dr. Reed, my paper deals with a new technic of uniting the ileum and colon after resection of the cecum and ascending colon, together with the reasons for and principles of the operation. Consequently, I did not go into the indications for operation. Two of the seven resections reported have been for stasis. I have never seen a case in which I thought that complete resection of the colon was justified for stasis, and these are the only two cases out of about one hundred cases of intestinal stasis in which I thought that resection of even the cecum and ascending colon should be done. If there is considerable sagging of the transverse colon that could be corrected by shortening the gastrohepatic and the gastrocolic omentum.

Dr. Moore stated clearly one of the objections to lateral anastomosis as illustrated by his personal experience. Dr. Clark, of Philadelphia, reported a somewhat similar case at the Atlanta meeting of the Southern Surgical Association a few years ago.

What constitutes the danger in properly placed intestinal

sutures, particularly in the large bowel? Leakage. Now leakage occurs in properly placed sutures from infection, from too poor blood supply, or from too much tension. The infection and poor blood supply are closely related and may be overcome by the methods described. Too much tension in a properly placed suture is from distention of the bowel from gas and can be obviated by enterostomy. Methods of obviating infection of the triangular mesenteric space and of cleaning out the stumps of the bowel have been dwelt upon in the paper and are exceedingly important. We would not think of sewing up a wound in the skin without attempting to clean it by means of some disinfection. If the end of the colon is not made as aseptic as possible when the thread pierces its lumen, it, of course, carries germs throughout the whole tissue and this may account for poor healing and late infection of the stitches. If the end of the bowel is clean, fecal matter, when turned on after removing the clamps, will only contaminate that portion of the thread within the lumen and there is less chance of infection from the thread that is buried in the tissue of the bowel.

Dr. Bloodgood states that one of the chief objections to end-to-end anastomosis is that suturing the ends together is not safe. However, the ends are present in lateral anastomosis. You cannot "wish" them away. In lateral anastomosis the two ends are sutured separately, making two distinct procedures; whereas in the end-to-end method, the difficulties are divided. The whole procedure depends upon avoidance of infection and reasonably careful suturing at the mesenteric border.

In regard to Dr. Seelig's question, if there is but little mesentery to the colon, the colon is always mobilized by incising the peritoneum on its outer side and pushing the colon toward the middle line. Then all the vessels and the mesentery close to the bowel are clamped and tied and packed off with moist gauze before the bowel is opened. Resection of the colon can be carried out by the same method described by omitting the valve formation feature.

It is, in my judgment, highly important to prevent distention in the region of intestinal suturing. This will make so much tension on otherwise well placed sutures that they may cut loose. The colon can be kept collapsed on the left side by the insertion of a tube through the rectum, but on the right the tube would have to be too long and would probably press too greatly upon the flexures. This tension can be relieved by using enterostomy as suggested in this paper.

Dr. Bloodgood says that the operation here described would be very valuable if it could be made safe. Within the last ten years I have done seven resections of the cecum and ascending colon in which I have united the ileum to the colon end-to-end. This comprises all of the resections of this segment of the bowel that I have done during this period, except one in which there was a sarcoma, and as there was no chance of a radical cure, the ends of the bowel were merely brought into the wound, no effort being made to suture them together. The patient recovered from the operation but died a few months later from the progress of the disease. As the bowel ends were not sutured together, this case cannot be properly included here. We have, then, seven operations following the general lines of the technic described without any deaths. Three of these patients have died subsequently from diseases not in any way connected with the operation. Not only has there been no operative death but there has been no complication whatever resulting from the operation. While the group of cases is not large, it is without fatality and without complication following the operation and, so far as this goes, it seems impossible to make it any safer.

NOTES ON TWO SIGNS IN CHRONIC APPENDICITIS

By Robert T. Morris, M.D.
New York City

One of the most frequent visitors to the doctor's office is the patient with indefinite pain of transitory character belonging to the right side of the abdomen. If the patient consults the surgeon the latter is prone to find symptoms of chronic appendicitis, and he sometimes alarms the patient with a prognosis of impending disaster if the appendix is not removed. When this same patient enters the office of the internist with the appendix in the form of a question-mark the internist is prone to treat the matter lightly and to say that the pain is caused by gas in the cecum and ascending colon, a condition which is recognized readily on percussion of the abdominal wall. The majority of these patients belong to the neurasthenic group, patients with stigmata of decline presenting objective signs in stigmata of various structures of the body. The appendix vermiformis as a vestigial structure, with a tendency to undergo involution change of its various coats, appears to undergo involution earlier in patients of the neurotic group. Involution changes which normally might become marked in the average individual at perhaps fifty years of age may appear in the patient with stigmata of decline at the twenty-fifth year of age. The appendix undergoing involution-change with connective-tissue replacement of its coats becomes a source of irritation to the ganglia of the autonomic and sympathetic nervous

system. Nerve elements remain in such an appendix until practically all othes structures have disappeared and these nerve elements are irritated by the contracting of hyperplastic connective tissue. Irritation calls for special determination of blood supply to that point, and the control of the blood supply belongs in the domain of sympathetic nerve function. When the message from the irritated appendix is registered for a sufficiently long time upon the ganglia relating to the cecum and the ascending colon the muscular coats of the cecum and ascending colon eventually become exhausted. This part of the bowel then becomes more or less permanently distended with gas and gives us an important differential diagnostic sign belonging to chronic appendicitis and not to acute appendicitis. I call it the "cider-barrel sign," for the purpose of making a picture because percussion upon the normal left side of the abdomen elicits a note suggestive of a cider barrel in October, while percussion over the distended bowel on the right side brings out a note suggestive of the cider-barrel in March.

Another sign belonging to chronic appendicitis and not to acute appendicitis relates also to sympathetic nerve ganglia, apparently due to persistent registering of impulses. It is not unlikely that the impulse extends in an afferent way to a segment of the spinal cord and then proceeds efferently to one ganglionic point and at the same time to the skin in the zone described by Head as belonging to the appendix. The ganglionic point apparently relates to what anatomists sometimes now speak of as the "fused ganglion," consisting of the second and third right lumbar ganglia. Hyperesthesia of the fused ganglion will be in evidence if we make pressure deeply and slowly upon the patient's abdominal wall about an inch and a half to the right of the navel and a trifle caudad. When we find this tender point distinctly in evidence and standing alone without tenderness of the left lumbar ganglia there appears to be definite evidence that we are dealing with the appendix as the source of trouble.

Chronic appendicitis relates most frequently to an irritative lesion rather than to an infective lesion. It belongs most often to that irritation of nerve elements by the contracting connective tissue which belongs to involution-change. The irritative feature, however, may belong to ordinary scar tissue which has followed an infective involution of the appendix.

In chronic appendicitis cases the two signs here described appear to have distinct diagnostic value. When the source of irritation is in the vicinity of the pylorus or gall-bladder we find Mayo-Robson's tender point relating to the first sympathetic lumbar ganglion on the right side. When the sympathetic lumbar ganglia of both right and left sides are found to be tender on pressure we may look to the pelvis for the source of irritation. The pelvic ganglia receive and distribute impulses over such a large area that a chronic source of disturbance in the pelvis seems to be registered upon both right and left sympathetic lumbar ganglia instead of on the ganglionic point on the right side belonging to the appendix.

DISCUSSION

Dr. Charles M. Rosser, Dallas, Texas.—I have seen several cases of chronic appendicitis in which the symptoms were referable altogether to the left side, and I have not been able to explain why this was. I would be glad if Dr. Morris would explain the scientific mechanism of these cases.

Dr. Morris (closing).—Dr. Rosser asked about pain on the left side in cases of appendicitis when the appendix is on the right side. We have a crossed action at the cord center and that crossed action more often occurs with the ovary than with any other organ perhaps. Not infrequently with disturbance of the right ovary the pain will be upon the left side.

Dr. Carr asked about tenderness wherever he presses. Dr. Carr appears to be a strong man, and in this connection I will

say that a friend of mine, who came in from the mountains not long ago after being among the miners, said he met a long-haired man, a doctor at the mining camp, and asked him how he knew what to charge these men in the mining camp. He said that one man would have a lot of money, while others would not have much. The long-haired fellow said, "You don't understand this business of being a doctor in a mining camp. A miner carries all his money and gold dust in a belt worn around the waist. I feel around his waist and ask him whether he is tender here or tender there, and before I get through I can tell approximately how much he has got, whether it is ten dollars or one hundred dollars." Now, if Dr. Carr, instead of being so energetic, will make discriminating pressure, he will pick out the tender point at the site of the ganglion.

A SUMMARY OF THE SURGICAL TREATMENT OF GOITRE

By Miles F. Porter, M.D., F.A.C.S.
Fort Wayne, Ind.

Generally speaking, surgical services are sought by goitre patients because of (1) toxic symptoms; (2) pressure symptoms; (3) deformity; (4) and a combination of these difficulties. When patients with symptomless goitres seek the surgeon's services for fear their benign goitres may become troublesome, and not until then, will there be achieved all that is possible in the relief and cure of this disease.

I should like to repeat here what I have said in effect several times before,[1] viz., that the wisdom of removing simple goitres for fear of their becoming toxic is quite as evident as is the wisdom of removing warts, moles, scars, etc., for fear of their becoming malignant. Subtotal thyroidectomy is the operation of choice in all patients who are good surgical risks. "Safety first" is the slogan here as universally elsewhere, and, therefore, the incision should be ample and located with a view to an adequate exposure of the gland. Whether or not the muscles should be divided on one or both sides depends upon the individual case. The rule should be to divide the muscles when necessary to secure adequate exposure of the operative field. When divided, the section should be made as near the upper attachment as possible. It is preferable to grasp all the tissues, including

[1] Detroit Med. Jour., March, 1915.

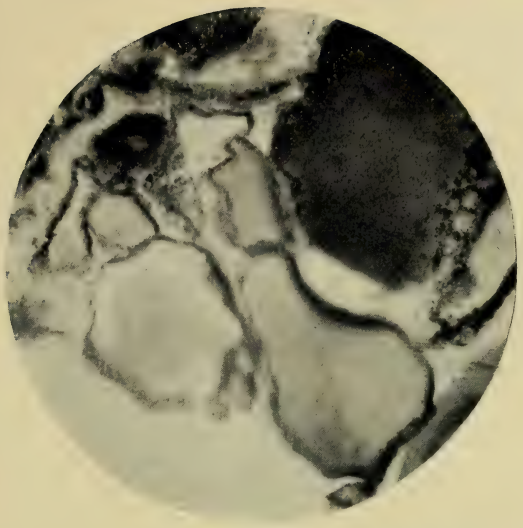


Fig. 1.—Case of exophthalmic goitre in female, aged thirty-five years. Thyroid was removed and soon thereafter the gland was injected with about 200 minims of boiling water. Microscopic examination of the part thus treated shows some necrosis of the epithelium here and there, with absence of the colloid substance in some of the alveoli and loss of its staining characteristics in others. Many of the alveoli are distended and the interstitial connective tissue is slightly edematous.

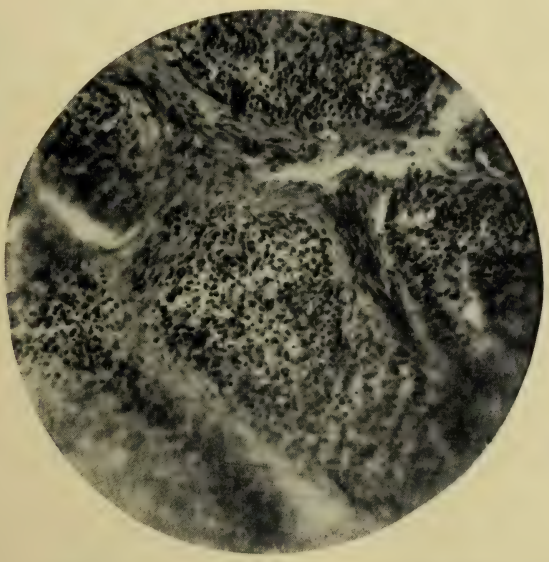


Fig. 2.—Section of thyroid removed from female patient after treatment by injections of hot water. Sections made four months after last injection and ten months after first. The prevailing picture is one of connective-tissue hyperplasia. Note the thick strands of cicatricial connective tissue constricting and compressing the parenchyma, thereby completely obliterating the gland structure. × 265.

Figs. 1 to 4 from Surgery, Gynecology and Obstetrics, January, 1915.

Fig. 3.—Hyperplastic goitre with adenomatous enlargement. Moderate symptoms of hyperthyroidism.

Fig. 4.—Mixed type of goitre. Note central white mass of fibrous tissue with cyst at top surrounded by areas of hyperplasia (darker areas) and colloid (lighter areas).

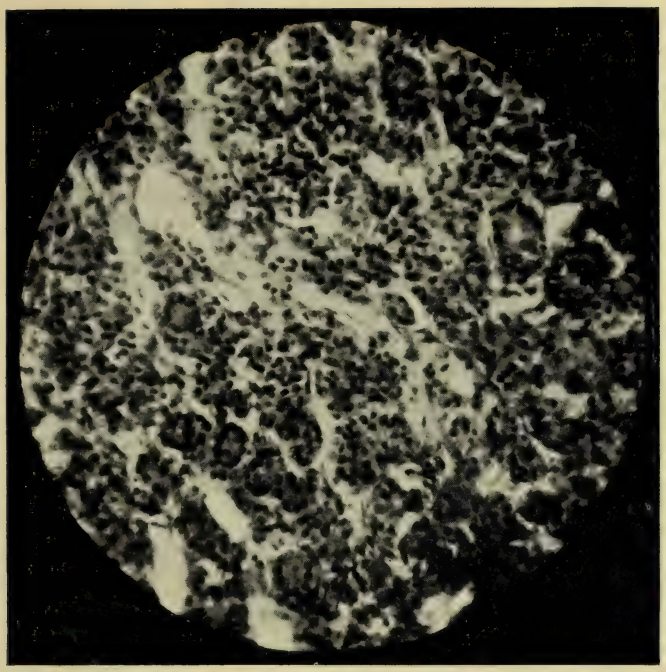


Fig. 5.—Miss B. Taken from the pale portion of the gland. Note the hyperplasia and compare with Figs. 6 and 7.

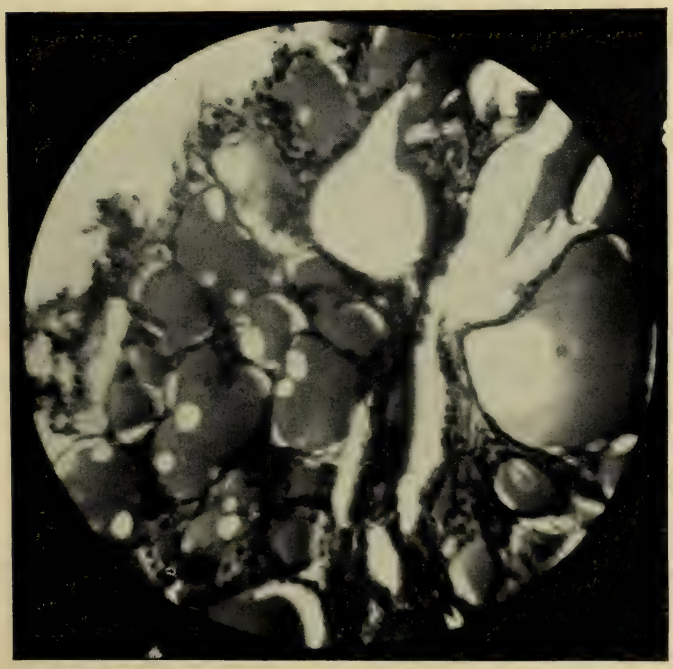


Fig. 6.—Miss B. Section from red portion of thyroid, showing very little hyperplasia and much colloid.

Figs. 5 to 11 from Annals of Surgery, October, 1916.

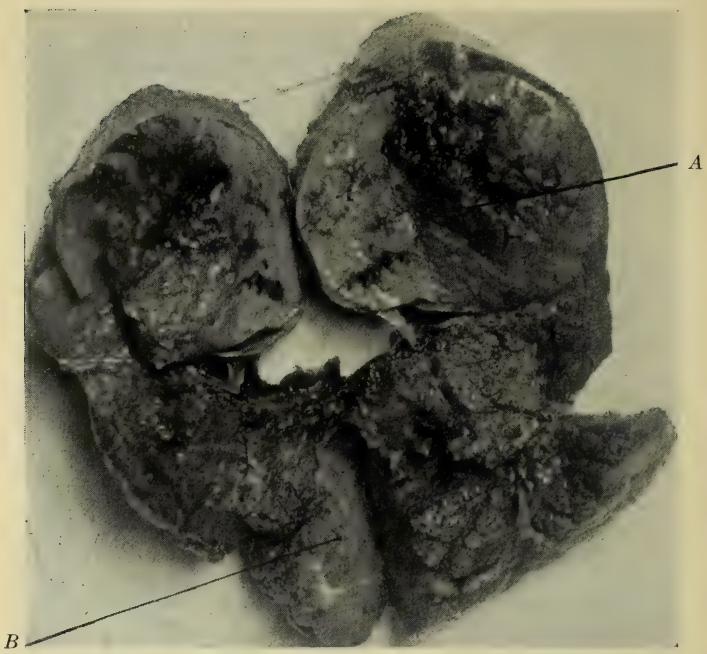


Fig. 7.—Miss B. Photograph of section through gross specimen, showing encapsuled tumor (*A*) in upper half of the picture and dark normal thyroid below (*B*). The tumor contained the trouble-producing tissue and was very much lighter in color and less firm than the non-hyperplastic portion.

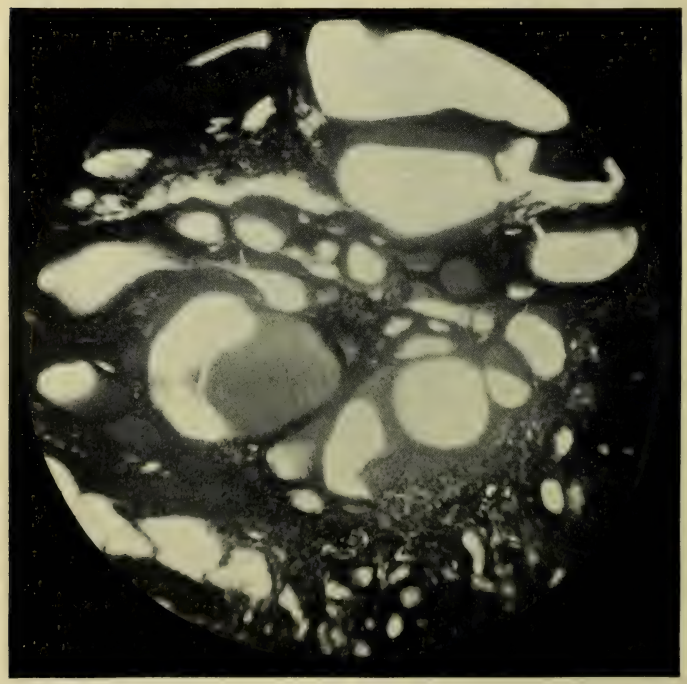


Fig. 8.—Miss D. Section from red portion (see Fig. 10, *A*) of gland, showing simple goitre.

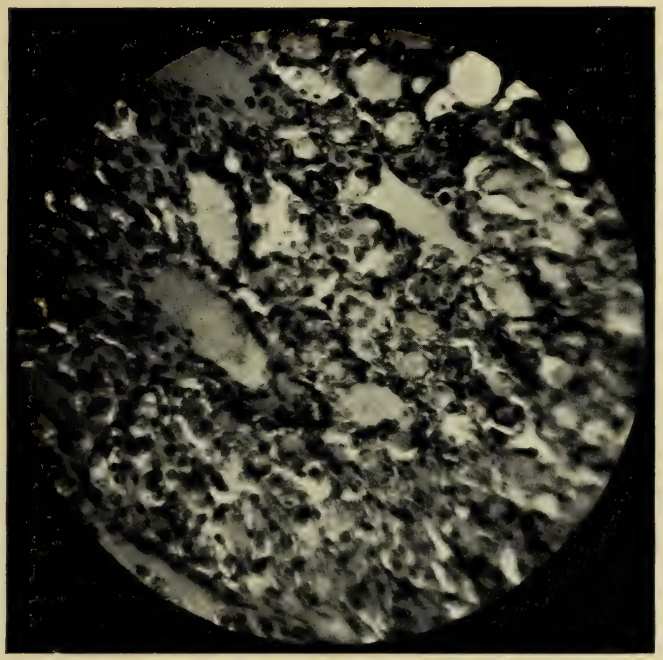


Fig. 9.—Miss D. Section from lighter part of gland (see Fig. 10, *C* and *B*), showing hyperplasia.

Fig. 10.—Miss D. *A* is the dark and *B* the light lobe, from which Figs. 8 and 9 were made. *C* shows gross section through lighter portion of the gland.

Fig. 11.—Mrs. S. Shows two views of gross appearance of the thyroid. The nodular condition suggests malignancy, while the light color prevailing suggests hyperplasia. This case presented aggravated symptoms of hyperthyroidism with exophthalmos. Compare with Figs. 12 and 13. In this case the toxic symptoms and malignancy developed in a goitre of long standing. A timely operation in this case might have prevented both the toxic symptoms and the malignancy.

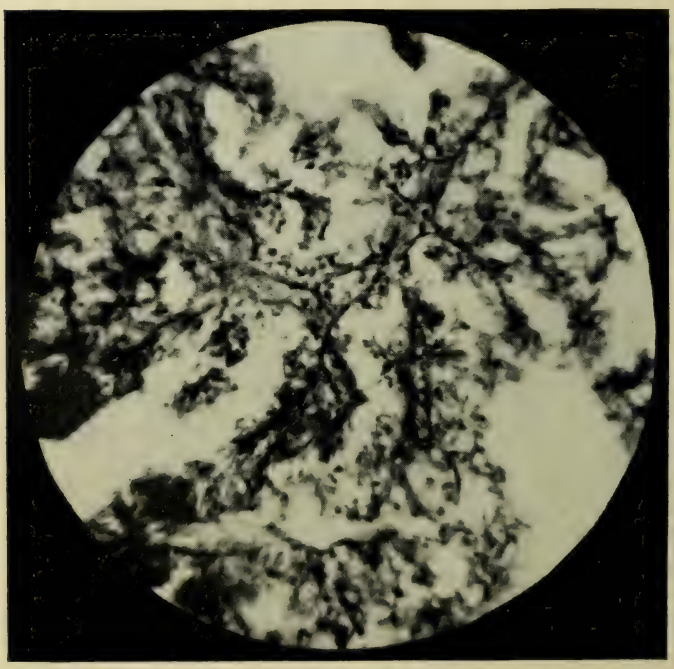


Fig. 12.—Mrs. S. Section showing hyperplasia with cytolysis.

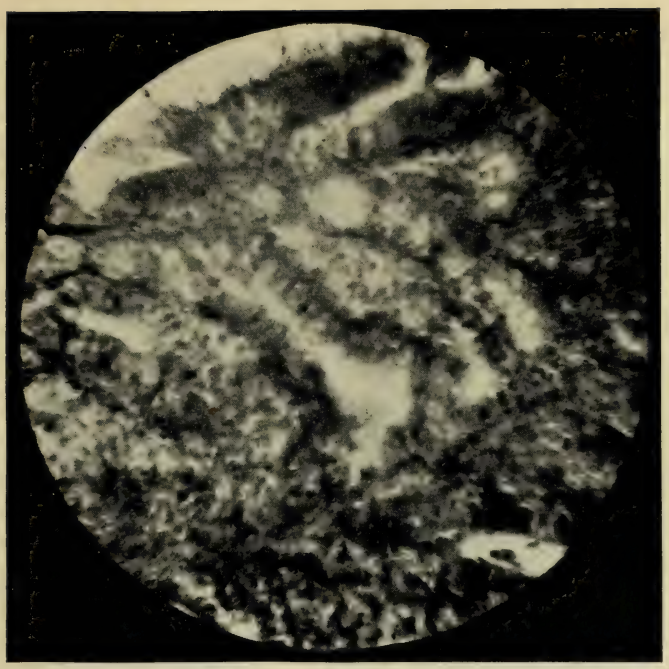


Fig. 13.—Mrs. S. Section showing hyperplasia of malignant adenomatous type.

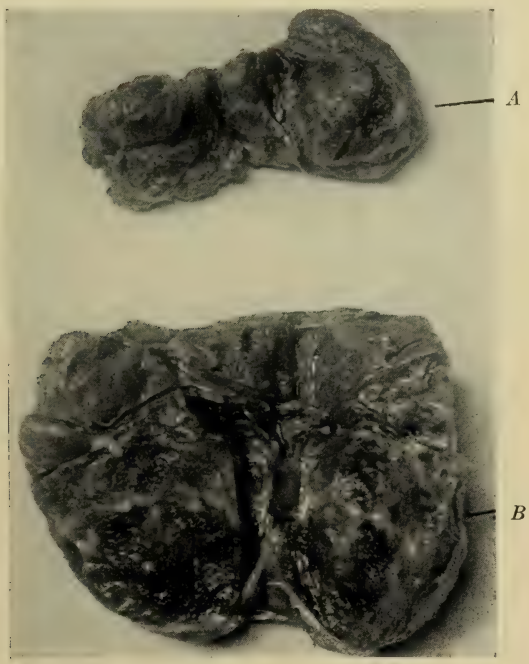


Fig. 14.—Mrs. M. Showing surface and contour of gross specimen (*A*) and gross section (*B*). This was a goitre of long standing in which symptoms of hyperthyroidism later developed. In *B* may be seen the white spots and streaks indicative of fibrous and calcareous changes.

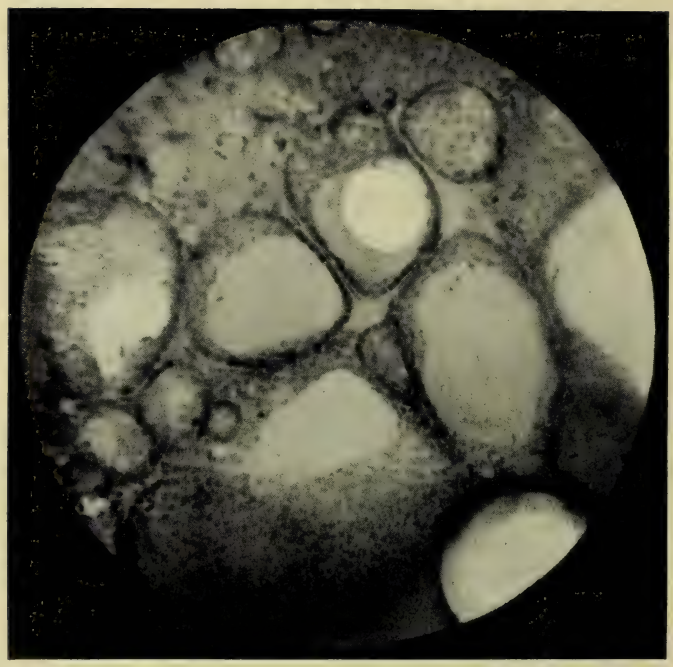


Fig. 15.—Mrs. M. Section showing marked hyperplasia. Section made from lighter, softer portions of the gland.

the superficial fascia and muscles on the side or sides to be divided with two forceps and make the incision between. Properly placed sutures will coapt all structures divided and effectually prevent hemorrhage.

For circumscribed hypertrophy, cysts or adenomata the incision may be made relatively small, with safety, provided it be properly located. There is no orthodox incision for goitre.

In cases of general hypertrophy wherein subtotal removal is contemplated, a full exposure of the gland should be secured not only for the sake of safety, but for the further purpose of enabling one to judge more accurately of the characters presented by the different parts of the gland. In a previous paper[1] I called attention to the fact that the hyperactive portions of the gland could usually be distinguished from the normal or inactive portions. It is generally believed, I think, that the hyperactive gland structure is usually red, rather firm and somewhat resembles beefsteak. On the contrary, it has been my observation, in quite a number of cases, that the hyperactive, trouble-producing portion of the gland, as indicated by the microscopic picture present, is often, if not usually, lighter in color and softer than the normal gland structure. Further observations made since those upon which the statements made in the paper above referred to were based confirm the conclusions reached therein.

With the style of dress commonly worn by women today it is impossible to locate the incision so that the scar will be covered. It follows, therefore, that the scar should be as inconspicuous as possible. To achieve this end the incision should be made to follow the natural folds of the skin; the skin should be cut through at right angles to the surface and the skin wound should be closed with subcuticular sutures with the aid of adhesive plaster, if necessary, to perfect the coaptation. A stitch scar in a place where it attracts

[1] Annals of Surgery, October, 1916.

attention is a surgical sin. No other method of wound-closure with which I am acquainted gives as good cosmetic results as the one here recommended.

Lobectomy is frequently an unsatisfactory operation in that it leaves the neck asymmetrical and often fails to give adequate relief. The portions of the gland structures to be left after thyroidectomy should be selected with a view of avoiding future asymmetry in so far as is possible. One should leave not any more gland structure than would amount to one-fifth the normal; the aim should be to leave normal gland tissue. Non-functionating gland tissue is useless, and hyperplastic tissue, if left, will keep up the symptoms of intoxication for a longer or shorter time, and sooner or later degenerate and become useless. That it will not always be possible to select normal tissue to leave, I am, of course, well aware, but that efforts made along this line are well worth while I am convinced.

It is perhaps better always to divide completely the isthmus when it can be done without additional risk. This procedure is advised with a view to the relief or prevention of the pressure symptoms. Preservation of the posterior capsule will effectually protect the parathyroids and recurrent laryngeal nerves. Drainage adds to both the safety and comfort of the patient, and it is therefore seldom wise to omit it. Strips of rubber dam make the best drainage material. Drains should be removed as soon as the discharge becomes negligible, usually at the end of forty-eight to seventy-two hours after the operation. Adhesion of the skin to the larynx or trachea is not an infrequent cause of annoyance. This can be avoided by securing the interposition of a layer of cellular tissue between these structures.

Generally speaking, ether anesthesia is the safest and most satisfactory. To this rule there are, of course, exceptions, but they are rare. It is generally conceded that when a patient dies from appendicitis it is almost always because someone has blundered. The sooner it is generally conceded

that it is a grievous error for a goitre patient to put off consulting the surgeon until the time for safe surgery is past the sooner will the number of goitre deaths be decreased. In the present state of our knowledge concerning goitre there is no excuse for any but a very small proportion of goitre patients first seeking surgical relief after the time for safe surgery is past.

For the preparation of the substandard risks for the major operation, injections of boiling water into the gland substance is more effectual than any other known procedure. In quite a percentage of patients with small goitre of the diffuse hyperplastic variety, injections of boiling water should be the treatment of choice in that it is efficacious and entails less risk and less loss of time than any other method of treatment equally efficient. This method of treating goitre has already been published,[1] is now in quite general use, and a detailed presentation of the subject at this time is unnecessary. I will ask you, however, to bear with me while I present a few lantern-slides illustrating the immediate and remote effects of injecting boiling water into the thyroid tissues.

In closing I should like to urge the special importance of foci of infection in goitre patients. Not infrequently the removal of these foci will cause the goitre symptoms to disappear. To allow such foci to remain after thyroidectomy is to invite a recrudescence of the goitre symptoms. Besides, it should be remembered that thyroidectomized patients are especially vulnerable.

DISCUSSION

Dr. John R. Wathen, Louisville, Kentucky.—It is with some hesitation that I discuss a paper like Dr. Porter's, for the reason that the majority of us have had very little experience with injections of hot water in cases of goitre. I take it to be an excellent remedy, and I can see the logic of his argument.

[1] Surg., Gynec. and Obst., January, 1915, pp. 1 to 5.

We have had presented before this Association during the past years a number of papers on this subject, and while there are a great many moot points, I will only call attention to a few things in connection with his remarks. I believe today that we have to deal with a great many varieties of goitre, and a good deal depends upon the time the patient has had the goitre, and the physical conditions we find. I was formerly much more radical in my treatment of exophthalmic goitre than I am today; in fact, I am becoming more conservative. I am doing more and more pole-ligations. I believe we reduce the mortality to a low point by the proper selection of our cases for operative work. Pole-ligation under local anesthesia, if the patient is properly prepared, is attended with a lower mortality in comparison with any radical procedure.

In regard to the preparation of the patient, there has been a great deal written upon this phase of the subject. My personal experience and knowledge, after doing several hundred cases, has taught me that there are very few things of any real value. One remedy a Swiss surgeon called our attention to a number of years ago, which has not received much weight, is the tincture of strophanthus, which, if given in small doses, is valuable. If it is given as a fresh preparation in two- or three-drop doses one hour after each meal and the patient is put to bed and given the rest treatment the patient will yield wonderfully to this treatment. I have observed in these cases that patients after this treatment who had a pulse of 140 or 150 would have it reduced to 100, and they would easily stand pole-ligation. After the pole-ligation has been done on one side or both, if one will continue the strophanthus for six months to a year it is little short of marvellous how large glands will disappear. They will shrink rapidly and disappear, and the patients are cured symptomatically.

In regard to the cystic and adenomatous goitres, those which will present future complications, and where future operative work is required, I differ with the doctor in regard to the technic. I presented a paper before this Association several years ago in which I advocated that more careful attention be paid to the anatomy of the neck. There is a plane of cleavage between the deep fascia and the platysma muscle, and, if one nicks the skin with scissors, he will strike this plane of cleavage and will leave the deep fascia over the muscles, which are much easier to cut and to suture if the fascia is not injured. We can dissect along

the plane of cleavage nicely and secure a beautiful result. As to closure, by this incision we are benefited in that we have a platysma which has not been separated from the skin. I much prefer the use of the Michel clips. I have been using them for ten to fifteen years with little scarring. There is much less of a scar as compared with the subcutaneous stitch. The clips are removed at the end of five days. The cosmetic effect is better, and, if we watch this plane of cleavage, there will be less adhesion of the skin to the muscles; there will be less deformity from the standpoint of scar formation and rigidity of the neck can be avoided. I have advocated elevation of the gland, not with the fingers but by lifting up the gland with volsellum forceps, and in this way there is very little danger of injuring the recurrent laryngeal nerve.

Dr. Charles M. Rosser, Dallas, Texas. — I have been wondering for two or three years whether the statement made by Dr. Cabot, of Boston, from the standpoint of an internist, was representative of the views of internists regarding the treatment of goitre, and if so, whether surgeons are justified in the rather unanimous opinion they seem to have favoring extirpation.

Dr. Cabot was a guest of the medical profession of Dallas three years ago, and in referring to the subject of goitre he stated that the surgical treatment of goitre was all wrong, and that the good effect which surgeons claimed from surgical treatment was due to the rest which the patients received and to the plan of management which they had during that time. This statement was made before an audience of three hundred doctors scattered over the territories of two States, and I felt compelled to challenge his statement. I do not know whether I was right or not.

Dr. Reed has claimed, I understand, to cure goitres by colectomy. I have not seen his statement nor have I heard it from him. As Dr. Cabot is considered such a high authority and is surrounded by so many of his surgical colleagues in Boston, the query has arisen in my mind whether our surgical enthusiasm has carried us too far, and, before this discussion closes, I should like to hear from Dr. Mixter, as a Boston authority, as to whether there is any difference of opinion between the Boston surgeons and Dr. Cabot in this regard.

Dr. Samuel J. Mixter, Boston.—I do not think I feel confident to discuss that phase of the subject referred to by Dr.

Rosser. Dr. Cabot is a very remarkable man, but I would rather take some one else's statement about this matter. Perhaps I am too enthusiastic in my views, but I think that the feeling in the surgical part of the profession has been expressed very well by Dr. Mayo, that "one must treat the cause and not the symptoms of hyperthyoidism." I feel that I could not discuss Dr. Cabot's remarks.

Dr. S. L. Ledbetter, Birmingham, Ala—I have had only a small experience with the boiling-water injections as a preliminary to later thyroidectomy. It has, in the cases I have seen it used, improved the condition of the patient and made a later operation safer. Personally, I am more in favor of ligation as a preliminary measure than the use of boiling water, because I have seen two or three rather bad cases of sloughing, particularly of the skin, due to the injection.

As regards the matter of technic, women, of course, are always particular about the scar. I have found that suturing the skin with the Michel clips has given the nicest scars of any other method. It is also important to close the platysma, and I close it with fine catgut or silk. I pass the thread through, not only coming out and then down, but also that the little knots will be underneath the platysma and not underneath the skin, because occasionally there will be the escape of a drop or two of serum in that locality, and there will be a slight disfigurement from the scar at that point.

As to the results in these cases of exophthalmic goitre, operation will not do the trick. If a patient comes with a pulse of 120 or 130, and after operation it comes down to 80 or 90, when she leaves she is very much improved; but, if one lets that patient go back and do as she did before, the symptoms will return. As Dr. Porter has said, it is very important to remove all foci of infection, and for one year after operation the patient should have prolonged physiological rest to secure the best end-results.

Dr. Ernst Jonas, St. Louis, Mo.—There is no doubt that goitre is in the main a surgical disease, except perhaps the goitre of the adolescent period or of pregnancy. Trouble lies in the fact that we surgeons frequently depend upon the internist to determine the proper time for operation. He treats the cases until it is rather late in the game, and if the results then are not as good, perhaps, as they ought to be or the internist had hoped they would be, he is inclined to accuse us of operating too much.

Dr. Henry O. Marcy, Boston, Mass.—As to the cosmetic effect, I will take this opportunity to repeat what I have said here on several occasions, namely, if one employs a running buried suture of absorbable material, and the wound is properly approximated and sealed with iodoform collodion and let alone, repair follows without scar. Success lies in a careful technic. I think most of us ought to be apprentices to tailors to learn how to sew. If doctors took a few lessons in the use of buried sutures and closed the wound in such a way that no stitches are to be seen there would be great improvement in technic. In other words, no stitch is seen, none removed and at the end of ten days there is practically no scar.

Dr. Miles F. Porter, Fort Wayne, Ind. (closing).—I am very much obliged to the members for the liberal discussion that was given my paper. First, regarding the assertion of Dr. Cabot. Rest in bed is not necessary to cure a case of exophthalmic goitre. I have seen and have had a number of cases of exophthalmic goitre who got well on boiling-water treatment only—I will not say because of it, but they did get well and still kept at their work. I have one young woman, a librarian, who still kept at her work; she was bad enough to have had an amenorrhea of over three months' standing. She never stopped work for as much as a week all told during the time of treatment, and she remains well. I do not know what cured her absolutely, but I do know that the goitre disappeared after two injections of hot water.

Not every individual who has exophthalmic goitre has got six months or more to rest. Time is worth more than money to some of these individuals who would like to get well, and there is no question but they can get well without going to bed. Mind you, I am not arguing against rest; it is a valuable adjunct to the treatment; but you can cure goitre without putting the patient to bed at all. They will get well, and you can draw your own conclusions.

If any practitioner has a slough after injecting boiling water into a goitre he does not understand the technic. I have made hundreds of injections and have never had a slough occur. If one injects the goitre and not the skin, then one will not have any sloughing of the skin. If one has sloughing of the skin, his method should be modified, around the almost microscopic point where the needle pierces the skin there will be a few cells killed. But sloughing of the skin never occurs if the work is

properly done. I do not understand why men should use non-absorbable sutures or ligatures and leave them buried. I do not see any reason for it at all. One can do anything with an absorbable suture that he can do with non-absorbable, so far as I have been able to demonstrate.

Regarding the lifting of the goitre, I have used forceps, but lately I have been finding myself lifting the goitre with an ordinary claw retractor such as one would use in pulling down the prostate in doing a perineal prostatectomy. One can change the hold more easily than with a volsellum and lift the goitre up, and the tension on it while removing it from the posterior capsule lessens the hemorrhage very materially; it has added a good deal to the readiness and satisfaction with which the work is done.

Regarding pole-ligation, I do not object to it at all, but if one stops to think that the thyroid receives twenty times as much blood as does the head or neck, and that all blood in the body can pass through the thyroid in an hour, that this blood is carried from four different points of the compass and these points all coalesce in a vascular circle very like the circle of Willis, he can imagine what he can do with ligation. One can do more with an adequate injection of boiling water than he can with two pole-ligations with six weeks in bed. That is all there is to it. It adds to the saving of time; it is worth while. The use of boiling water did not originate with me. But I had some very satisfactory results from following John A. Wyeth's suggestion that it be used in angiomata, and I thought we could destroy goitre in that way safely.

DUODENAL FISTULA, WITH CASE REPORT

By George A. Hendon, M.D.
Louisville, Ky.

The subject of duodenal fistula, traumatic in origin or otherwise, is accorded scant consideration by the majority of surgical authors. Careful search of available literature reveals the record of but few such cases, abstracts of which are presented in connection with some personal observations.

When one considers the anatomical location of the duodenum, and especially the proximity of the retroperitoneal fixed portion to certain other intra-abdominal viscera, it seems remarkable that the organ so frequently escapes injury during the execution of surgical procedures for hepatic, renal, gastric and cholecystic pathology. On the other hand, it must not be forgotten that duodenal fistula may be the result of minute perforating ulcer without the infliction of trauma. Regardless of its mode of origin, duodenal fistula represents an exceedingly dangerous lesion from the standpoint of the patient, and may present perplexing therapeutic problems for the surgeon.

Based upon observation and experience Palmer states that duodenal fistulæ following operative procedures "are neither the rare nor the simple, benign affairs the silence of the professional pen might lead one to conclude." Edgerton observes the "result may be a short running, rapidly fatal, duodenal fistula;" and Pannett adds that, so far as can be ascertained from the literature of the last ten years, "a

duodenal fistula never heals without surgical aid, and, if left, is invariably fatal; moreover, that death may be exceedingly rapid; recovery from a duodenal fistula, even with adequate surgical treatment, is a rarity."

In my opinion the foregoing quoted therapeutic views are entirely too pessimistic. If the character of the fistula be recognized sufficiently early it should be amenable to treatment by the intelligent application of modern therapeutic principles. In making this statement, however, I am not unmindful of the important clinical facts: (*a*) That inanition may occur much more promptly in the presence of duodenal fistulæ than those involving other portions of the intestinal tract; (*b*) that marked tissue dehydration may early ensue; (*c*) that there may be a rapidly increasing and fatal toxemia from systemic absorption of deleterious products.

The local manifestations resulting from discharge of the duodenal contents, which include the gastric, hepatic and pancreatic excretions, upon the cutaneous surface may be extremely annoying to the patient. The digestive power of these secretions upon the tissues is well understood. "Digestion of the skin of the abdomen and back is so rapid and unrelenting as to make the life of the patient a hardship: to himself because of discomfort and pain and to the nursing force because of the frequency of the needed dressings." (Palmer.) For the same reason, erosion of the sinus may occur and be followed by extensive hemorrhage. Necrosis of the fatty tissue has been observed and peritoneal involvement may ensue from destruction of protective adhesions by the digestive process.

Case Report.—Mrs. K., widow, aged seventy years, the mother of eight children, the youngest being thirty-two, the oldest forty-five. This patient was first operated upon nine years ago for acute cholecystic empyema with calculi; a cholecystostomy was performed, several choleliths removed, and adequate drainage instituted.

She recovered within three weeks sufficiently to return to

her home, but a biliary fistula which discharged a large quantity of bile each day persisted for a period of one year. Her general health, however, during that time remained good. She suffered no discomfort excepting that incidental to the biliary discharge. After the fistula closed she appeared to have regained her normal health, but as a result of the operation a small hernia developed which apparently gave her little discomfort.

About the first of March, 1917, at intervals of two weeks, she began having acute epigastric pain, simulating the so-called "gall-stone colic," associated with abdominal distention, nausea and vomiting. During the last thirty days the attacks had increased in frequency to about two each week; each attack was associated with chills and temperature elevation to 106° F., followed by profuse perspiration. The attacks were independent of the ingestion of food, *i. e.*, they occurred regardless of whether the stomach was empty or contained food.

On April 21, 1917, she entered the hospital for operation upon the theory of recurrent choleliths. Celiotomy disclosed a healthy looking cholecyst attached to the abdominal wall by its fundus; no calculi were found; a cholecystectomy was performed and radical operation for cure of the hernia attempted. A rubber drainage tube was attached to the stump of the cystic duct. The second day after the operation she had a chill and temperature of 103° F., followed by a sudden and copious discharge of pus and bile. Convalescence thereafter progressed normally and she went home three weeks after the operation. The tube was removed at that time and bile and mucus continued discharging through the drainage tract. The discharge would cease at irregular intervals and about twenty-four hours later she would have a chill and her temperature would reach 106° F. Although there was no icterus, it was thought there was an obstruction in the common duct, which resulted in the absorption of bile or that its escape externally was interfered with in some way.

In August, 1917, the patient was again taken to the hospital with the intention of making a permanent fistula. Under local anesthesia dissection was made downward to the stump of the duct (or what was supposed to be) and a soft-rubber tube sutured in position with gauze packed around it. She went home within a week after this operation. So long as the sinus discharged freely she felt well. However, the discharge which occurred around the tube was greater than through it. The tube was extruded in three weeks, when she again began having chills, followed by high temperature as before.

On October 23, 1917, she was again taken to the hospital, with the idea of making a second attempt to establish a permanent fistula for the escape of bile, based on the theory that the chills and fever were produced by absorption of proximate biliary principles. The chills were peculiar in that they were exceedingly severe, followed by a temperature of 106° F. and profuse perspiration, but without any evidence of exhaustion. The next day after an attack, if the fistula was discharging, she was able to attend to her ordinary household duties as if nothing unusual had happened.

October 23, under local anesthesia, with a probe in the fistula as a guide, dissection was made which seemed to lead into a small cavity about where the stump of the cystic duct should be. As soon as this pocket was reached there occurred a "gush" of thin, viscid material mixed with bile. A drainage tube was inserted into the pocket and gauze packed around it.

The next day there began copious discharges of duodenal contents which consisted of bile, mucus and partly digested food. The volume of the discharge was so great that it quickly soaked through the dressings and soiled the mattress upon which the patient lay. The dressing had to be changed every two hours. Oakum pads were used to absorb the discharges. The skin was protected with a rubber dam and the fistula was packed every day with gauze strips saturated with compound tincture of benzoin. The discharge grew

rapidly less, and within five weeks from the date of the last operation the fistula had entirely closed. The patient left the hospital and there has since been no recurrence of her former trouble. More than a year has elapsed and she has remained in good health ever since.

It is my opinion that the fistula in this case had its origin in an ulcer of the duodenum which destroyed the mucous and muscular wall and produced a pin-hole leak in the peritoneal covering; that the pain and chills and fever were the result of the escape of a few drops of duodenal contents into the surrounding tissues; that the improvement of the patient after the chill was due to a temporary closure by lymph deposits over the leak and that the subsequent chill and fever was the result of dislodgment of the protecting patch of lymph. This long-continued and intermittent escape of minute quantities of irritating material resulted in the formation of a defensive system of protective adhesions. At my last operation it is evident that a rent was made at the site of the ulcer, which accounted for the sudden and copious discharge of duodenal contents. The patient, however, was fortified against disaster by the adhesions already referred to.

I think it is a little singular that we were able in this case to control the discharges by plugging the opening in the intestine with gauze saturated with benzoin. And we were extremely fortunate in securing complete recovery by this simple procedure. I am convinced now that the cholecystectomy which I did was a superfluous operation. If I had performed a gastro-enterostomy instead the patient would have been cured of the duodenal ulcer without the subsequent suffering which followed the cholecystectomy.

I recall one other patient who was operated upon for cholelithiasis and about sixty calculi removed. A fistula persisted, and as long as the discharge continued she was comfortable, but when it ceased she had violent pain and gastric disturbances. Six months later I did a cholecystectomy. The cholecyst looked perfectly healthy. The common duct was

drained through a tube attached to the cystic duct. The drainage was very free, but apparently consisted of bile only. At the end of three weeks the tube was removed and the patient was cured.

My theory now is that symptoms simulating cholelithiasis occurring subsequent to the removal of biliary calculi are due to ulcers about the ampulla of Vater on the duodenal mucous membrane. These ulcers are caused by the contact of infected bile. They are cured by drainage incident to operation. I think the cases that are relieved of symptoms following drainage of the cholecyst in which no calculi are found also belong in the same class.

According to the literature, Van Vranken (1894) was among the first to direct attention to this subject. He cites the case of a male, aged forty-five years, who had a large abdominal abscess of obscure origin (not appendicular) pointing over the left Poupart ligament. Incision and drainage revealed that the abscess cavity communicated with the descending colon. After a month of fecal drainage urine also appeared and persisted for several weeks. The fistula finally healed completely.

In 1914 Mayo reported 3 fatal cases of duodenal fistula following right nephrectomy, 1 operated upon by himself and the remaining 2 by other surgeons with whom he was associated. The fistula developed a few days after operation and death occurred within two weeks. The following year the same author recorded the successful closure of a duodenal fistula, which also followed right nephrectomy. The operation was performed transperitoneally through a right rectus incision, the fistula being closed transversely and protected by an omental graft. Summers and Canarel are quoted as also operating for similar pathology by the transperitoneal route. In Thevenard's case a duodenal fistula developed ten years after nephrectomy in a persistent sinus, probably of tubercular origin, which had existed since the nephrectomy, with intermittent abscess formation.

Pannett cites a case in which four days after development of a duodenal fistula the condition of the patient was desperate. Immediate celiotomy was performed under Crile's anoci-association technic of local anesthesia, with a small amount of ether. The duodenojejunal flexure was identified, an eight-inch loop drawn through the wound and a lateral anastomosis made between the afferent and efferent limbs. A rubber catheter was anchored into the efferent segment, the bend of the loop being then sutured to the parietal peritoneum and the wound closed. There was no shock. Peptonized milk and egg were injected into the intestine through the catheter before the patient left the operating table. This method of feeding was continued regularly, and food was also given by the mouth. The patient rapidly improved and discharge through the fistula diminished. Ten days later no bile staining could be seen, the next day the jejunostomy tube was removed and no leakage occurred. The author states that recovery of the patient was complete in about six weeks.

Davis records in detail a case of duodeno-ureteral fistula of spontaneous origin. The patient, a male, aged twenty-nine years, had complained four years of dull, aching pain in the right flank, with pollakiuria, extreme urgency and bladder irritation. Had an acute attack of abdominal pain one year ago; appendectomy without relief. Bladder symptoms aggravated and urine contained a greenish, purulent-looking material. Roentgenoscopy, cystoscopy, ureteral catheterization and pyelography; diagnosis functionless, right kidney, probably resulting from previous inflammation.

Nephrectomy August 6, 1917: A knuckle of duodenum was pulled upward by traction on the kidney and a small area of duodenum (about 1 sq. cm.) was intimately associated with cicatricial tissue, including ureter, pelvis and vessels, "in an indistinguishable mass." As the duodenum could not be dissected free without danger of injury a small button-shaped piece of scar tissue (about 2 cm. in diameter), including the

site of duodenal attachment, was severed from the larger cicatricial mass and left attached to the duodenum, as was also a portion of the fibrous wall of the pelvis of the kidney, which was incised during the operative steps. The scar pedicle was then clamped and the kidney removed.

On the fourth day after operation there appeared a profuse, watery discharge, having the odor of duodenal contents and producing extensive excoriation of the skin. The discharge ceased on the twelfth day and there was no further skin digestion. The wound slowly granulated, and healing was complete in seven weeks.

The author remarks that this case is doubly interesting in that it further emphasizes the danger of duodenal injury during nephrectomy and presents a most unusual (and apparently unique) condition, viz., a definitely demonstrable fistula connecting the duodenum and the ureter, which existed prior to the execution of any operative procedure. "In view of the history of intermittent attacks of chills and fever accompanied by pain in the right flank; of the evidence found at operation of an old inflammatory process involving the perirenal tissues; and of the fact that the duodenum, excepting at one point, was normal in appearance and consistency, the most plausible explanation of the origin of the duodeno-ureteral fistula is that the latter was preceded by a perinephritic abscess which went on to spontaneous cure by rupture into both the duodenum and the ureter. The condition cannot be explained by an embryonic defect on account of the diverse origins of the duodenum and the ureter, the former arising from entoderm and the latter being an evagination from the Wolffian duct, which is derived from mesoderm. It was fortunate that during the operation a good exposure was obtained, because the knuckle of soft-walled duodenum, when pulled upward alongside the dense scar tissue at the hilum, could not be palpated, and was discovered only by inspection. It might readily have been clamped and severed with the pedicle, particularly if the necessity for hastily

controlling hemorrhage through an inadequate incision had arisen. The most interesting feature was the immediate cessation of bladder symptoms on the day after operation, the overnight return to normal of a bladder which for two and a half years had been a constant source of distress. The only reasonable explanation is that the irritability was due to the constant presence of small amounts of duodenal content, and presumably trypsin, in the bladder." (Davis.)

During cholecystotomy Gardner found a mass of adhesions involving the liver, cholecyst, stomach, duodenum and omentum. The cholecyst was small, apparently mostly scar tissue, and not particularly inflamed. Extending from the fundus of the viscus to the duodenum was a fistula, the diameter of a lead-pencil, and embedded in the fistula was a calculus the size of a large pea. This was "milked" into the cholecyst. The common duct region was a mass of dense fibrous adhesions, and, as the duct was probably obliterated, it was deemed unwise to perform cholecystectomy and destroy the fistula, and drainage of the cholecyst might mean a duodenal fistula. Two concretions were removed and the cholecystic incision closed. The patient's temperature promptly receded to normal and the icterus subsided. On the ninth day the wound discharged profusely a thick, foul pus which later became thin and excoriated the skin. This discharge continued for about a month. There was in this case probably a subphrenic abscess, with leakage through the cholecyst and fistula. The patient finally recovered.

Palmer records two cases of duodenal fistula cured by expectant treatment, which he says contemplates several objects: (*a*) protection of the skin and the tract itself against the digestive action of the excretions, (*b*) introduction of fluids and nourishment in quantities sufficient to maintain not only life but also the reparative power of the tissue, (*c*) reduction in the amount of gastric and intestinal excretions and (*d*) neutralization and dilution of these excretions. As protective measures he advises a low melting-

point paraffin applied hot to the skin or a solution of pure gum rubber in benzine; the sinus is injected with liquid petrolatum and zinc oxide ointment; liquid paraffin in large doses is also administered by the mouth. Ten per cent. glucose solution with sodium bicarbonate may be used by rectum; a small amount of tincture of opium will aid in controlling rectal spasms. Acid-producing food must be avoided and alkalies administered. Atropin and epinephrin have the greatest inhibitory effect upon the gastric excretion. Milk, fats and oils may be used. Dilution and neutralization of the excretions may be further accomplished by slightly alkaline solutions applied to the sinus through a rubber catheter.

His first patient was a male, aged fifty-five years, who had undergone gastric resection for carcinoma. Duodenal fistula developed on the eighth day; there was an abundant discharge of bile and pancreatic fluid; abdominal skin digestion was rapid and extensive. Discharge ceased after eight days under atropin and sodium fluoride; solution of the latter also used for wet abdominal dressing and injection into sinus. Paraffin frequently painted over the skin as a protective coating. The patient was discharged cured in fourteen days.

The second patient was a male, aged seventy-four years, who was operated upon for cholecystic pathology. There was a markedly contracted cholecyst, with an impacted concretion in the papilla of Vater, which was removed by the transduodenal route. On the sixth day the drainage became suddenly profuse and caused extensive digestion of the abdominal skin. Dressings had to be changed every two hours and on two occasions were saturated with blood. Fistula healed in twenty-eight days under expectant treatment.

In Cheever's case a duodenal fistula developed on the fifth day after operation for duodenal rupture. There was considerable tissue digestion and skin irritation. Continuous irrigation of the sinus with sterile water through a rubber

tube was inaugurated and continued for five days and nights. The digestive juices were thus kept diluted and immediate cessation of the destructive process was noted. Recovery in six days.

REFERENCES

Burnham: American Journal of Roentgenology, April, 1917, iv, 173.

Cheever: Boston Med. and Surg. Jour., September 23, 1915, clxxiii, 454.

Davis: Jour. Am. Med. Assn., February 9, 1918, lxx, 376.

Gardner: Boston Med. and Surg. Jour., October 11, 1917, clxxvii, 523.

Mayo: The Mayo Clinics, 1915, vii, 349.

Mayo: Jour. Am. Med. Assn., January 31, 1914, lxii, 343.

Ochsner: Tr. Am. Surg. Assn., 1905, xxiii, 314.

Palmer: Jour. Am. Med. Assn., March 2, 1918, lxx, 594.

Pannett: The Lancet, London, April 18, 1918, i, 1109.

Thevenard: Paris Chir., 1913, v, 870, quoted by Davis, l. c.

Van Vranken: Tr. New York Med. Assn., 1894, xi, 553, quoted by Davis, l. c.

PATHOLOGICAL STUDIES IN THE RECENT EPIDEMICS OF PNEUMONIA

By William G. MacCallum, M.D.
Baltimore, Md.

We have had two great epidemics of pneumonia in the course of the last twelve months, the first one ranging from the end of November to the end of May, the second, which affected a far greater number of people, beginning in the late summer and autumn. I shall try to describe the winter epidemic first.

It was particularly prevalent in the Southern Army Camps at first, but later affected the Northern Camps and to some extent the civilian population. I think we may say that it was largely the result of crowding together of men, a great proportion of whom were rural individuals, drawn by the draft from distant parts of the country and unexposed in their childhood to children's diseases; they suffered from measles which predisposed to pneumonia caused by the secondary invasion of bacteria. The nature of this pneumonia I shall try to make clear to you.

Two types of bacteria were especially prominent in this secondary infection, the pneumococcus and the hemolytic streptococcus. The pneumococcus in one of its forms we found rather frequently and saw that it produced lobar pneumonia just as it does in ordinary times in civilian life. The hemolytic streptococcus was far more often encountered either alone or in combination with the pneumococcus. It

produced at least two forms of pneumonia which were less familiar, and when it was combined with the pneumococcus one could distinguish the effects produced by each.

The influenza bacillus of Pfeiffer was often present in the throats and sputum and sometimes even in the lungs and pleura in association with the streptococcus. At that time we were inclined to lay but little stress upon its occasional presence, but since we have learned in the course of the second epidemic that it can produce pneumonia unaided by other bacteria, these cases have been reviewed. It must be recognized that it may have played an important part in producing the tissue changes in a few cases but in most cases the streptococcus occurred alone and the pneumonia must be ascribed to it.

The forms of pneumonia which we recognized as caused by the hemolytic streptococcus were as follows: In certain persons the streptococci were limited to the purulent exudate in the bronchi except in so far as they were carried through the lymphatics of the lung to the pleura. In these the bronchial walls and the whole framework of the lung became thickened and infiltrated with cells, an exudate of fibrin and mononuclear cells filled the alveoli immediately about the thickened bronchi and later became partly organized. This produced nodular masses about the smaller bronchi. In other persons the streptococci spread rapidly through great areas of the lung filling the alveoli with bacterial masses and an exudate of leukocytes and blood. There was no induration of the bronchial walls or the framework of the lung but extensive necrosis of the involved areas.

The first form seemed to indicate a high degree of resistance which enabled the tissues to set up the barricade in the bronchial walls and other tissues. This we called interstitial bronchopneumonia. The other form appeared to be the natural consequence of such lack of resistance as allowed the streptococci to invade freely. It was designated lobular pneumonia. In both types the pleura was quickly infected

and the effusion of fluid became a most prominent feature. This was a thin, watery, turbid, brownish fluid at first, loaded with streptococci, but later it became thick greenish pus. The treatment of such empyemas has been the chief concern of surgeons in the epidemic. If the individual survived, the pleural surface became covered with a thick layer of fibrin and the pleural membrane itself greatly thickened and indurated. Encapsulation of the purulent exudate by adhesions of the pleural surfaces was common, and I wish to mention especially the frequent localization of such a pocket of pus between the lung, pericardium and diaphragm in a space bounded by adhesions between these adjacent surfaces.

Attention should be called in this connection to the work of the Empyema Commission at Camp Lee, and especially to the work of Major Graham, which was carried on in our laboratory during the summer. It showed that the reason for the ill success of early operations which laid open the chest was the tendency to asphyxiate the patient when there were no adhesions to hold the lung in position against the chest wall. Pressure changes exerted upon the lung in that pleural cavity are at once communicated to the opposite side.

The second epidemic of pneumonia was the immediate consequence of the phenomenal sweep of the epidemic disease influenza over the country. Influenza is a disease which has occurred in epidemic or pandemic form at intervals throughout centuries. Its course is still quite unknown. Pfeiffer studied cases of bronchitis two or three years after the last pandemic and found in them a bacillus which without any proof he claimed to be the cause of the epidemic disease. We were all, except the French, more or less hypnotized by this, and many accepted the statement that this bacillus was the cause of the disease. It has been found, however, to be a very common inhabitant of the nasopharynx in all sorts of respiratory disease or in the absence of any disease, and was naturally found throughout this fresh epidemic. There

is no reason for thinking it the cause of influenza, but it has been found in pure culture in the tissues as the cause of pneumonia, and hence it must be regarded as a serious pathogenic organism as ready as the pneumococcus or streptococcus to act as a secondary bacterial invader.

We studied the pneumonia at Camp Lee, Camp Dix and at the Johns Hopkins Hospital. At Camp Lee and in Baltimore the influenza bacillus was seldom discovered, while at Camp Dix it was present in every case. It may be supposed that in certain places it is ordinarily a common inhabitant of the throat or that it spreads like the streptococcus to produce, as a secondary invader, an epidemic infection.

All the fatal cases which began with the epidemic disease, influenza, died of pneumonia. The influenza produces a profound depression or lowering of resistance which permits any pathogenic bacteria which may be in the throat to invade. Consequently in most instances there was a mixed secondary infection, but the pneumonia took the form characteristically produced by the predominant invading organism.

We could distinguish those in which the pneumococcus was predominant from those in which the hemolytic streptococcus was the essential bacterial invader, and these in turn were readily distinguished from those in which the influenza bacillus of Pfeiffer occurred in pure culture or as the predominant organism. The type of pneumonia produced by the Staphylococcus aureus was in our cases not so characteristic.

Owing to the marked predisposition, pneumococci multiplied in the lungs enormously and death occurred when the lungs were in a state of beginning confluent lobular consolidation with extreme edema and hemorrhage. The alveoli contained a most delicate network of fibrin with few leukocytes and many red corpuscles. The bronchi contained only frothy fluid; the framework of the lung itself was unchanged and there was little or no pleural exudate. The cut surface of the lung showed areas of consolidation which were elastic

and firm but not rigid, dark red and rather translucent so that one could see a red gelatinous fluid in the alveoli instead of opaque alveolar plugs.

When the hemolytic streptococcus was the predominant organism, edema and hemorrhage were even more marked. The exudate was in places dense, but most striking was the extraordinary number of bacteria in each alveolus; matted chains of streptococci almost filled these cavities and whole areas of the lung substance about them were necrotic.

In the cases in which the influenza bacillus of Pfeiffer was found in pure culture the lungs were rather paler, the bronchi filled with thick pus and the tissue of the lung studded with pale, firm, yellowish, shot-like nodules. These were peribronchial and showed microscopically great thickening and infiltration of bronchial and alveolar walls, and of the whole framework of the lung. The bronchi and alveoli contained leukocytes with few influenza bacilli and organization of the exudate was common.

In the first epidemic the measles appeared to be a frequent and important predisposing cause. Pneumococci, influenza bacilli and especially hemolytic streptococci were the secondary invaders. In the second epidemic the disease influenza was the great predisposing cause. While its etiology and its effects on the tissues are unknown, it was followed by pneumonia caused by the secondary invasion of pneumococci, staphylococci, streptococci, influenza bacilli or a mixture of these organisms. The anatomical characters of the pneumonia were found to depend upon the organism concerned but were much affected by the state of resistance of the individual.

DISCUSSION

Dr. Samuel J. Mixter, Boston, Mass.—We are very much indebted to Dr. MacCallum for the excellent account that he has given of the influenza epidemic. There is one point which was

brought out at Camp Devens which he did not refer to, and which I did not see in any of the slides that he has shown, and that is emphysema, which was very common there. There seems to be a breaking down of the bronchioles and interstitial emphysema occurs, marked by large bullæ on the surface of the lung, occasionally rupturing and giving a single or double pneumothorax, or else working up through the root of the lung into the neck and then spreading all over the body. Some of these patients had emphysema from the top of the head to the soles of the feet, and, in spite of that, recovered. I have seen subcutaneous emphysema so extensive that the man could not have sunk if he had been thrown into water.

Dr. John C. Oliver, Cincinnati, Ohio.—There are two points I wish to speak of in which civilian experience is different from military or camp experience. Camp Sherman is located within a few miles of Cincinnati and the influenza epidemic struck this camp early. It was quite a little while before the city of Cincinnati was involved. We had the advantage of talking with the medical officers in charge of Camp Sherman, and there were certain things forcibly impressed upon our minds as the result of these conversations. The first thing was that the mortality in camps was very much greater among men who came from the rural districts. In the second place, that the mortality in empyema cases was very large. With this experience before us we were prepared to corroborate these statements, but in civil practice the mortality in the rural districts has been very much less than the mortality in the urban districts, remarkably less. So far as cases of empyema are concerned, we find the same thing is true. Those of us who have been practising surgery for several years have been led to believe that cases of empyema, as ordinarily encountered in civil practice, are not followed by a very large mortality. It was the experience of all of us when the cases of empyema began in Cincinnati that we approached them with fear and trembling, feeling that there was some difference between the empyema now occurring and that which occurred in times past. At first we tried the army methods of non-interference; later we went back to the method of rib resection and free drainage, with satisfactory results. I think out of possibly fifty cases in the Cincinnati General Hospital in which free drainage was employed we had one death; this in comparison with the army statistics is a very remarkable thing.

A third point impressed upon my mind was that we had one certain ward in the Cincinnati General Hospital in which it became almost a necessity, because of social conditions, to have more patients than ought to have been in that ward. Our mortality from influenza in that ward was vastly greater than in the other wards where overcrowding did not occur.

Dr. Joseph C. Bloodgood. Baltimore, Md.—The chief surgical complication in these cases of influenza is empyema. Dr. MacCallum will doubtless recollect that during the first epidemic I called his attention to some observations we made in the early days at Johns Hopkins. The majority of our cases of pneumonia admitted to the hospital were late cases of empyema, and we expected the majority of cases of empyema to get well. They were resected and drained, but during the period of 1892 we had a few cases entirely different from the other cases. We operated early when there were no adhesions of the lung. The fluid was less purulent; the patients died. It is my recollection there were two or three such cases, but I have always remembered those cases as distinctly different. I cannot remember them as being distinctly different clinically, but from a surgical standpoint they were. Opening and draining the lung made them worse, and when this epidemic took place and a high mortality was reported in some of the camps very early it occurred to me that we were dealing with a different type of empyema, and I think we should bear that seriously in mind.

Second, I remember distinctly seeing a few cases of post-operative pneumonia; we looked them over carefully and they were not very sick, and we tried aspiration first. They may have gotten well if we had resected first. These few cases were aspirated every day or every other day for a few days or a week. The thing that impressed me was that when we did resect a rib and drain we were dealing with a small cavity, with a distinctly adherent lung, and we had a very much more rapid convalescence.

As to draining an empyema with a non-adherent lung and a large cavity to get rid of pus, our experience is too small to speak with any degree of authority, but we got good results in civil life because we opened and drained. At St. Agnes' Hospital, in the beginning of the second epidemic there were no cases of empyema. In the first epidemic they occurred chiefly in camps. We had a high mortality, and I think I am correct in stating

that we did not operate upon a single case of empyema. There may have been some overlooked. The number of cases was far too large and the staff too small for careful records. We had five hundred cases there some days and after the epidemic was over and after a certain period—I have forgotten how many weeks ago—patients began to come in with empyema, most of them from homes, with rather poor environment, most of them late cases of empyema, and we said, Why were not these cases sent in earlier? I cannot tell you the total number of cases, but there are now fourteen in the hospital. The remarkable feature is that they were late cases in which the lungs were adherent, and they have all recovered from simple drainage. That is an entirely different type of empyema, and I hope Dr. MacCallum, if he has the data, will say a little more about the indications for operation in the different types of empyema, because that is the thing we are going to be called for where it is not possible at least to try aspiration first.

Dr. Major G. Seelig, St. Louis, Mo.—There are one or two phases of this empyema epidemic, as interpreted in the military service, that have rather ironical significance. In the first place, just at the time when we had established prophylactic medicine and surgery on a pretty secure basis (as a result of venereal prophylaxis, venereal disease assumed insignificant proportions, diarrheal diseases were fairly under control, typhoid was almost specifically under control and malaria and similar diseases were practically unheard of) and the Army felt thoroughly secure in its position, this frightful epidemic arose and almost overnight the division of surgery in Washington found itself overwhelmed with a new, poorly understood disease, attended by a mortality of anywhere from 40 to 70 per cent. You can imagine the state of mind occasioned by facing such a proposition.

The second bit of irony was resident in the fact that this disease, though primarily pneumonia, a medical disease, the empyema complication manifested itself so rapidly, sometimes within the first forty-eight hours, that the deaths were necessarily construed surgical deaths. I do not think that this Association can properly appreciate the service rendered by Dr. MacCallum and his colleagues in helping to clear up the situation in so far as it was possible to be cleared up. At all events the surgical division was confronted here with an epidemic especially of empyema which required immediate attention and, if possible,

a solution. It may interest you to know what their plan of action was. There was a pneumonia commission from the laboratory division represented by Dr. MacCallum and his colleagues, and a questionnaire was framed by the surgical division to get at the fundamental considerations that might serve as a guide in lessening mortality. That questionnaire eventuated in the appointment of a surgical empyema commission. This commission took up fundamental considerations; they studied the incidence of the disease, the method of treatment and reports came from various camps.

An important point was the late treatment of empyema, and in the short time I have at my disposal I can only give you a very rapid survey. We may say, in the first place, I do not think the incidence of empyema has yet reached a status where we can say anything dogmatic or definite about it. Having gone over the early questionnaire, I gained the very firm conviction that empyema had all the aspects of a metastatic infection, due primarily to a generalized infection with predominating pulmonary symptoms. I cannot say whether that is true or not; it is not absolutely borne out by blood cultures, but there was something in many of the cases to warrant such a conclusion. Only within the last two days in conference with one of the members of the surgical empyema commission I was told that in practically every case in which adequate search was instituted in empyema that came to autopsy it was possible to demonstrate perforation of the lung; in other words, the existence of a lung abscess; that, whether miliary or otherwise, an abscess perforating into the pleura was demonstrable in every case that died of empyema and came to autopsy. That would, of course, furnish us with a very clear and very simple explanation of the incidence of empyema.

Dr. William A. Downes, New York City.—I think if we will speak of the empyemas we are seeing now in camp as those following secondary pneumonias, we will get a better conception of the condition. Ordinarily, in civil life we think of empyemas as secondary to ordinary pneumonias. When a patient has pneumonia with a localized abscess, if we resect a rib and institute drainage he practically always recovers. Those cases which we have seen now follow bronchopneumonias secondary to measles, influenza and other acute diseases. Measles at the present time is giving most of the trouble at Camp Jackson, and we have now thirty-five cases. I have had seven in the last

five or six days. All these cases came on and appeared to be an acute invasion, that is, they have a virulent infection from ten days to two weeks after measles, and the exudation is very profuse. Relief of the mechanical impediments by aspiration gives temporary relief. They fill up again in a few days, we have to reaspirate them and in the course of another week or few days the thing will localize, and if a simple incision is made between the ribs and a drainage tube is introduced, recovery occurs in a good percentage of the cases.

The mortality has been reduced recently since the empyema commission has called our attention to the value of relieving the mechanical condition, allowing the lung to become localized and then instituting drainage, washing with Dakin's fluid. There can be no question as to the value of that treatment. These cases, when they go on and die, are cases that have not been relieved as disclosed at autopsy, and one will find in them secondary pockets. A recent case of a large mediastinal abscess would have been benefited by incision and drainage. The sooner we can detect these secondary pockets the better. It is important to take *x*-ray pictures in time during the process of the disease when one is not satisfied with the progress the patient is making. That is one thing we have learned to depend upon a good deal. I have seen cases in which a secondary pocket, opened two or three weeks after the progress of the disease was not satisfactory, was followed by ultimate recovery. It is very important to keep close track of these patients, watch the other chest and see these cases in conjunction with a medical man. We have divided our service between medical and surgical men in the last two or three weeks at Camp Jackson; we have had a medical consultant making the rounds in the wards every day. He goes over any chest in which a patient is not doing well. Since then we have picked up many cases that probably would have succumbed. The Dakin treatment is carried out systematically by one man who does nothing but follow up cases by irrigation and sees that the wounds are in proper condition. I have seen two or three cases in which the edge of the ribs became necrotic, and for that reason a simple incision between the ribs with the introduction of a large drainage tube is the wiser method of treatment. I think undoubtedly the mortality in these cases will be diminished by aspirating, delaying operation, then operating at a time when the lung is in a much better condition.

Dr. Robert Carothers, Cincinnati, Ohio.—I would like to ask Dr. MacCallum to say something in his closing remarks about prophylactic vaccines.

Dr. MacCallum (closing).—In the few minutes I have to speak there are many points that cannot be taken up. Dr. Mixter asked about emphysema. We saw a good deal of that and it was just as extensive as he described. We were a little confused at first by the first case we saw, because it was definitely a gas bacillus infection which had arisen in the arm. It might have been due to the use of a dirty hypodermic needle. I am not sure. The patient was distended with hydrogen, and at the autopsy on applying a match there was a great burst of flame from the peritoneal cavity. There were a few cases following that in which we attempted tests which did not show the presence of hydrogen. We were tempted to believe that these were mechanical interstitial emphysemas from rupture followed by extravasation of air into the lung; but I am not sure about that, because subsequently in making sections I found in some of these cases large bacilli which looked like gas bacilli, and I had an idea that gas bacilli could advance into the substance of the lung by way of the necrotic tissue about the bronchi. Again, the patients did not cough very hard, and the idea that this was purely a mechanical emphysema was difficult to maintain. It is a question we will have to elucidate by further study.

Dr. Bloodgood and Dr. Oliver spoke of the mortality in empyema and Major Seelig referred to the same point. With regard to the differences between different cases of empyema the etiology is important. The civilian cases in olden times, and even those up to the present time, have been largely pneumococcus infections, and it seems to me that pneumococcus empyema is less serious than the streptococcic forms of empyema. The determination of the etiological factor is of great importance; all the rest largely depends upon the question of when to operate and how to operate. I think more light has been thrown on that by Major Graham's experiments than by anything else that has been done. His experiments show that if one opens the chest in a person who has no adhesion and no induration of the pleura, and no induration of the lung itself, and if one makes measurements of the pressure produced on both sides by introducing cannulæ, if the pressure which one produces on one side is 10 mm. it will be 9 mm. on the other side, the

mediastinum yielding readily. Major Graham further showed that the size of the opening was very important. If one makes an opening which is small in relation to the size of the glottis the animal maintains life and keeps up respiration for a long time. Just as soon as the size of the opening in the thorax exceeds a certain relation to the size of the glottis the animal becomes unable to maintain effective respiration. There is a mathematical relation between the size of the opening in the chest and the size of the glottis. If one keeps the opening small, increased respiratory efforts will keep the animal alive. If one makes it too large he will die from asphyxiation. The presence of adhesions and thickening of the pleura make the lung so rigid that pressure is not so readily communicated to the opposite side and asphyxiation does not occur in the same way.

What Dr. Oliver said about the mortality in country districts and crowding has been in our minds all the time. I do not know how to explain his statement of the smaller mortality in rural districts unless through isolation these people were less exposed, because the troops from the rural districts were much more susceptible to these infections and succumbed very readily. Dr. Bloodgood's cases of empyema in the early days before this epidemic arose must have been isolated examples of streptococcus infection which were very distinct in their character from the ordinary pneumococcus infections.

As to the channel of infection of the pleura, Major Seelig spoke of a possible metastatic infection. One sees clearly infection in the lung which travels along the lymphatics accompanying the bronchi to the pleura and against the stream of lymph. In the late cases at autopsy we have found abscesses which have perforated, and that is by no means an uncommon occurrence. There is extensive pleurisy associated with these abscesses in the lungs. We have not been able to cultivate the Streptococcus hemolyticus from the blood in many cases during life, but many others have reported finding it there. When there is a combined infection with the pneumococcus and Streptococcus hemolyticus, we have found the pneumococcus in the blood, but not the Streptococcus hemolyticus. I am not convinced even yet that septicemia is very prominent in these cases.

As to the remarks made by Dr. Downes concerning mediastinal abscess, I should like to have the surgeons look more closely at these mediastinal abscesses. The mediastinal abscesses, so-called, that I have seen were in most cases encapsulated,

localized pockets of pus between the interior mesial surface of the lung, pericardium and diaphragm, which might pass as mediastinal abscesses, but which were intrapleural pockets.

As to the use of vaccines, I am very conservative. Vaccines must be directed against definite organisms. There is no use in trying a vaccine against an organism which we do not know. It is perfectly logical to vaccinate against Type I pneumococcus and Type II or Type III or whichever one of the Type IV one is going to deal with. One may develop a vaccine against any of the members of Type IV, but it is difficult to know which of the many will be concerned. To carry out prophylactic vaccination against pneumococcus Type I, II and III is logical, and I hope it will prove successful in the careful experiments that are being carried on. Against the staphylococcus nothing has been done which is striking. Against the Streptococcus hemolyticus conditions are different. No vaccines have been produced which to my knowledge are reliable, but I may say that experiments are being conducted with the idea that the Streptococcus hemolyticus produces a toxin. A paper has been published on that point by Clark and Felton in which it was shown that when grown upon blood with Locke's solution, the hemolytic streptococcus will produce a toxin of a peculiar type which in graduated doses will render an animal highly immune against living streptococci, but so far no passive immunity has been produced by transferring blood from animals which are immune against living streptococci. As for developing a vaccine against the invasion of the streptococcus I am a little doubtful. One can with this toxin immunize an animal against the streptococcus, and that is satisfactory, but I do not see how we can apply that on a large scale to human beings. Inasmuch as we do not know that the cause of the influenza epidemic is the Pfeiffer bacillus, the development of a vaccine with that organism could only be expected to protect against the pneumonia which it causes as a secondary invader.

RADIUM DEMONSTRATION AT THE HOWARD A. KELLY HOSPITAL

By Howard A. Kelly, M.D.
Baltimore Md.

assisted by

Curtis F. Burnam, M.D., and Walter Lantsberry

Dr. Kelly: I feel that it is eminently fitting that, year by year, until the field of radium therapy is thoroughly opened up and understood, our Association should have placed before it as a body the results of radium treatment in surgical diseases, especially malignant affections, as well as in the leukemias, various splenic affections and Hodgkin's disease.

In a brief introductory I remind the Association that we are at present wholly dependent upon Colorado and the adjacent parts of southeast Utah for our supplies of radium, which are taken from the carnotite ores bedded there. Carnotite lies in a thin blanket, an inch or two thick, a short distance below the surface, where it rests after leaching through with the surface water, deposited on a thin layer of clay. It occurs thus in the interstices of a softish sandstone rock, is easily mined in a concentration of from 1.5 even up to 20 per cent., and yields a large quantity of radium, 7 mg. or more per ton. Our previous supplies of radium came from the pitchblende ores of Austria, bedded with the crystalline rocks at the opposite end of the geological scale, and these are not likely to become available again to any considerable extent owing to the exhaustion of the deposits.

Radium as a therapeutic agent is handled in one of two ways. In the form of one of its salts—the bromide, carbonate,

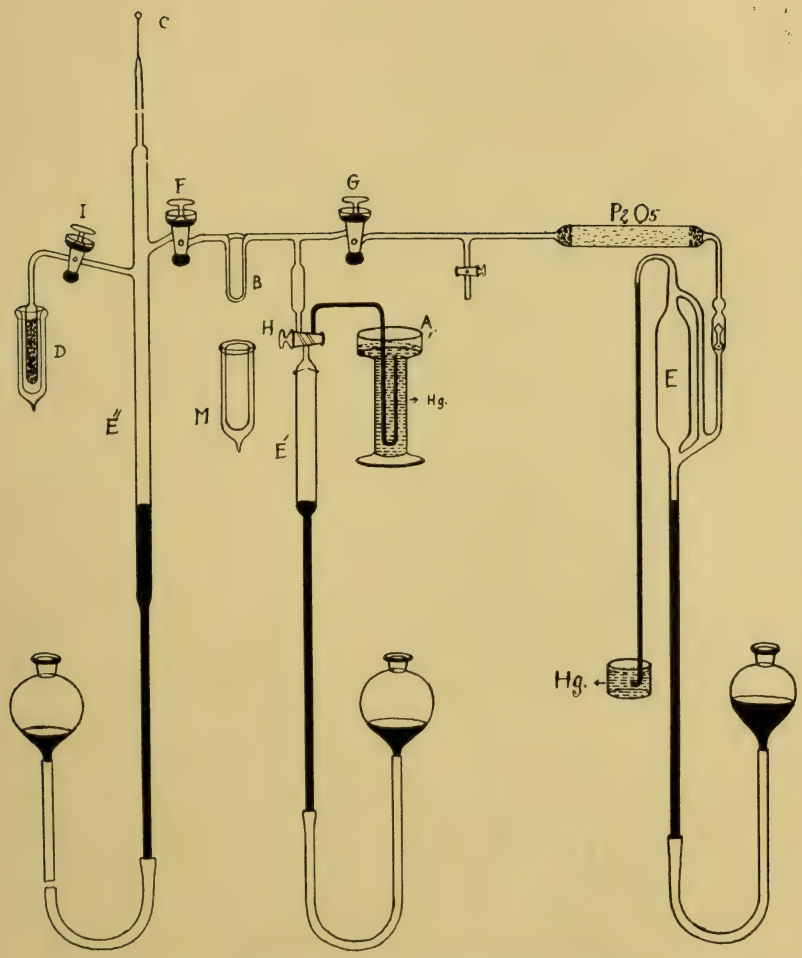
chloride or sulphate—it continually generates a gas called emanation, which is the efficient agent. This emanation can be separated from radium salts in aqueous solution by means of an air pump, forced into minute capillary tubes, sealed off and so conveyed away from the radium source of supply to the patient.

The difference between using the radium, which contains the emanation, at the bedside and the use of the emanation gas taken from the radium, is comparable to the difference between driving a cow to every door and milking her there and so delivering the milk to the family, on the one hand, and on the other hand, taking the milk from the cow out in the country and sending it to town to the purchaser in the customary way.

The use of emanation admits of making apparatus to suit the individual case, safer sterilization and equal effectivity. Intense concentration of energy can be secured through using emanation, for the equivalent of a whole gram of radium does not occupy a space as big as a pin-head.

Mr. Lantsberry: Radium radiation for therapeutic purposes can be obtained in two ways, either by the direct application of the radium salt itself in a hermetically sealed container or by the utilization of the gas, radium emanation, which is spontaneously produced by all radium salts. This gas is unstable and produces in turn a series of solid substances, which are known collectively as the active deposit of radium. From these solid substances and not from the radium itself the penetrating radiations are given off.

To collect and purify the radium emanation, one of the salts of radium dissolved in water is employed. From such a solution is obtained, by use of a mercury pump, a mixture of radium emanation, oxygen and hydrogen. Most of the oxygen and hydrogen can be eliminated by sparking and, if further purification is necessary, the gas is passed through a U-tube surrounded by a small Dewar tube containing liquid



Diagrammatic representation of apparatus employed in purifying and placing radium emanation within applicator. *A*, reservoir containing mercury; *B*, U-shaped tube in which emanation is frozen; *C*, small glass bulb into which emanation is finally forced; *D*, tube containing charcoal and surrounded by vacuumized vessel containing liquid air; *E*, Toepler pump by means of which entire apparatus is vacuumized before introduction of emanation; *E′*, *E″*, ordinary straight mercury pumps, *F*, *G*, *I*, one-way stopcocks, *H*, two-way stopcock; *M*, vessel for liquid air surrounding U-tube *B*.

air. The radium emanation condenses in the tube and the other gases can be removed by means of a pump. On removing the liquid air, the purified emanation is forced by means of mercury into a previously evacuated container of glass or metal of the required size or shape.

Dr. Kelly: Dr. Burnam and I have asked a few patients in the neighborhood, or living within reach, to come before you this morning that we may speak of their previous diseases and demonstrate the effectiveness of radium treatments. Let me emphasize the fact, as we make this demonstration, that radium does not cure all these diseases, but that we have reason to hope that it will give a relief in a substantial percentage of cases.

The lesson of radium is the lesson of general surgery and the lesson of intensive study of the cancer problem for the past ten years, namely, that all cases are easiest to handle which are recognized and treated in the early stages while the disease is localized. When a cancer or sarcoma has become disseminated the possibilities of successful treatment are greatly limited. Further, let me emphasize the fact that a large quantity of radium greatly extends the field and power of effectual treatment.

The technical difficulties encountered in the therapeutic use of radium are great. The radium therapeutist has a specialty as well defined as any other in medicine. It takes considerable experience to develop the curative powers of radium and not a little to avoid serious injuries from its use.

With these brief preliminaries I present the following cases:

1. Ovarian carcinoma, first radiated February, 1918; apparent recovery.

2. Mediastinal sarcoma with paraplegia, first radiated May, 1914; recovery.

3. Cervical Hodgkin's disease, first radiated June, 1918; recovery.

4. Universal Hodgkin's disease, first radiated October, 1917; complete disappearance of glands in neck.

5. Medullary carcinoma of right breast, inoperable, first radiated August, 1918; retrogression of disease down to one small nodule.

6. Extensive carcinoma of breast, inoperable, first radiated May, 1918; complete retrogression without irritation of skin.

7. Squamous carcinoma of larynx, first radiated March, 1917; complete recovery.

8. Basal-cell carcinoma of larynx, first radiated September 1913; recovery, voice normal.

9. Round-cell sarcoma of tonsil, first radiated September, 1916; recovery.

10. Round-cell sarcoma of tonsil or unilateral hypertrophy, first radiated July, 1918; complete disappearance.

11. Epithelioma of left tonsil and pharynx, first radiated November, 1918; improvement, still under treatment.

12. Epithelioma of buccal mucosa, first radiated August, 1918; recovery.

13. Epithelioma of gums, floor of mouth, tongue and lymph glands, first radiated March, 1918; recovery.

14. Epithelioma with leukoplakia of buccal mucosa, first radiated January, 1918; complete disappearance of disease.

15. Epithelioma of left ear, first radiated January, 1916; recovery.

16. Epithelioma of cheek, first radiated September, 1911; recovery.

Case I.—Miss L. K., aged eleven years. Multinodular ovarian carcinoma. Admitted February 14, 1918. Two weeks before had begun to complain of pain in the right side. Appendicitis diagnosed and operation carried out by Dr. Kelly, who found the pelvis choked with multinodular tumors, involving the uterus and extending down to the pelvic floor. The diseased tissue was only partly removed,

appendectomy and left salpingo-oöphorectomy being done. Microscopic section of ovary showed carcinoma.

From February to June, 1918, six radium treatments were given. From 1 to 4 grams were used and the time varied from three to five hours.

The diseased right ovary could be felt up to June 3, 1918. On July 23, the patient was examined but no disease was found. September 1 and November 1, careful examinations were made, the latter under gas, but nothing abnormal was made out. The patient looks and feels in the best of health. She is plump and rosy-cheeked.

Case II.—Miss V. J., aged nineteen years. Posterior mediastinal sarcoma which had led to paraplegia. Admitted February 13, 1914. Her illness had begun December, 1912, with an aching pain in her back, which developed into paralysis of both legs. She grew steadily worse up to March 25, when an exploratory operation was done by Dr. J. M. T. Finney, who found a large vascular tumor and removed a piece of it, which was lost. There was consequently no microscopic diagnosis in this case. The patient improved slightly for two weeks after the operation, but then grew worse.

Three treatments were given in May, July and December, 1914, with from 1½ to 2 grams of radium. She began to improve after the first treatment, and by the autumn of 1914 was able to walk easily and resume her duties at home. No further treatment was given until March 26, 1916, when 2 grams for two hours were used. The patient is apparently well and has been since December, 1914. She has been actively engaged in business for several years. The mediastinal shadow decreased but has never entirely disappeared.

Case III.—Mrs. H. F., aged forty-seven years. Cervical Hodgkin's disease. Admitted April 30, 1918. Her illness began January, 1915. She was operated on January, 1917, and glands removed which were said to be tuberculous. She had violent pruritus and difficulty in breathing. Physical examination showed glands above the clavicle. Microscopic

diagnosis from tissue was Hodgkin's disease. *X*-rays of chest showed a little thickening. Blood was nondescript.

Treatment was given June 28 with 2½ grams of radium for two hours and July 8, with 1½ grams for two hours. After these two treatments there was no itching and the glands disappeared. There has been no return up to the present time.

Case IV.—Mr. J. D., aged thirty-two years. Universal Hodgkin's disease. Admitted October 13, 1917. Trouble had begun two years and nine months before with swelling in the lower part of the right side of neck. Swellings in neck and axilla. Night-sweats. Patient ran a temperature as high as 103°. Microscopic diagnosis at the Johns Hopkins Hospital was Hodgkin's disease.

Has been under treatment for a year, twenty-five treatments in all having been given. Photographs taken on admission show enormous glands. There has been complete disappearance of these glands in the neck. There is still evidence of change in blood. Case emphasizes the importance of rest and feeding.

Case V.—Mrs. V. F., aged twenty-nine years. Medullary carcinoma of the right breast and of glands of axilla and neck. Admitted August 23, 1918. She had noticed a lump in her right breast eight months before. Since then other lumps had appeared in the breast and axilla. A hard mass filled three-quarters of the breast. *X*-rays of chest were negative.

She was given a number of massive outside treatments over the breast, axilla and arm with amounts of radium varying from 1 to 4 grams and time of treatment varying from one-half hour to six hours, eleven of these outside treatments in all during August, September and October. Her last treatment consisted of a 2 mc. needle inserted in the breast and was given November 5. There has been a complete disappearance of all evidence of disease except for one very small nodule in the breast. Only four months under observation.

Case VI.—Mrs. E. S., aged fifty-six years. Extensive carcinoma of breast. Admitted May 10, 1918. Five years before she fell out of a wagon and bruised her breast. A small lump appeared. Nothing was done for this until six weeks before admission, when a circular incision was made at the Johns Hopkins Hospital, in order to stop the spread of the skin nodules. Examination showed a deep scar around the right breast, which was hard. The entire area inside the scar was covered with nodules, and at several points nodules were found on the skin beyond the incision.

She was given a number of treatments with from 200 mg. to 4 grams, lasting from twenty minutes to four hours. The last treatment was on December 1, 1918. Case shown to exhibit the complete retrogression of skin nodules and lump in breast without irritation of integument six months after undertaking treatment.

Case VII.—Mr. I. B., aged fifty years. Squamous-cell cancer of larynx. Admitted March 30, 1917. In November, 1915, the trouble began as a "cold." On examination the patient was found to be a very emaciated man, wearing a tube in the trachea and hardly able to speak above a whisper. A huge laryngeal mass was present which pressed over the opening so as nearly to close it on both sides. No ulceration. Vocal cords not seen. Operative removal by Dr. Samuel Crowe March 30, 1917. Microscopic diagnosis at Johns Hopkins Hospital was squamous-cell carcinoma.

From March 30, 1917, to November 25, 1918, he was given twenty-five treatments. Some of these were outside and some inside. On October 4, 1917, the tracheotomy tube was removed and from that time to the present there has been no return of the disease.

Case VIII.—Mr. H. N. R., aged fifty-five years. Extensive basal-cell carcinoma of the larynx, causing obstruction. Admitted September 11, 1913. Microscopic section showed basal-cell carcinoma. Trouble began October, 1912. On admission intubation was carried out and the patient fed

through a catheter. Examination by Dr. Franklin Hazlehurst showed large lobulated mass involving the aryepiglottic fold on the left and similar smaller mass on the right. Vocal cords could not be seen, but were probably not involved as voice was clear.

Two radiations were given September 21 and September 24, 1913, from the surface of the neck with 609 mg. for three and nine hours. By October 10, 1913, the cords were perfectly visible and all that remained was a little thickening in the region of the right arytenoid. The patient was able to swallow. Skin burns developed which took some time to heal. Some months after treatment the tube was removed and the opening allowed to close. There has never been any recurrence. Voice is normal.

Case IX.—Mrs. J. H., aged twenty-two years. Round-cell sarcoma of tonsil and pharynx. Admitted September 6, 1916. In June, 1916, the trouble started with a cold. Examination showed the tumor springing from the right nose. Pharynx projected down beside the right tonsil. Roughly 6 or 7 cm. across. No enlargement of glands.

Given two inside treatments with 350 mg. and 730 mg. and two outside treatments with about 3 grams for a total of ten hours. Last treatment February 14, 1917. The mass decreased in size and by October 18, 1916, the growth was gone. The tonsils remained enlarged, were recently removed and sent for microscopic diagnosis. No disease present except chronic tonsillitis. No evidence of trouble at present. Patient has clear throat and neck.

Case X.—Mr. W. W. G., aged twenty-four years. Unilateral tonsillar hypertrophy or round-cell sarcoma. Admitted July 29, 1918. Diagnosis of sarcoma had been made by Dr. E. S. Judd from a piece of tonsil. Two months before admission the trouble started with an abscess of the left tonsil. Examination showed the left tonsil four times the normal size. *X*-rays of chest were negative.

During July, August and September 4 massive treatments

were given from the outside with 3 or 4 grams of radium. Duration of the first treatment was two hours and of the others one hour. Distance eight inches to three inches. There has been no evidence of trouble since the disappearance of the growth in August, 1918.

Case XI.—Mr. H. C., aged fifty-eight years. Epithelioma of the left tonsil and pharynx. Admitted November 7, 1918. Onset three months before with pricking sensation in the left side of the throat. Examination showed the left tonsil destroyed. Growth involved the soft palate. Both pillars were gone. Growth extended down the tongue but not on it. Was indurated and fixed. One enlarged gland at angle of jaw. Microscopic examination of tissue showed basal-cell epithelioma.

Given three treatments inside the mouth during November. Has been only six weeks under treatment, with marked improvement.

Case XII.—Mr. W. U., aged fifty-eight years. Epithelioma of the buccal mucous membrane. Admitted August 19, 1918. Duration of trouble eight weeks. On the buccal mucous membrane on the left side was an epithelioma of the wart type, about the size of a five-cent piece. This had been treated with *x*-rays two days before admission.

Two treatments were given one week apart. Each consisted of about 1½ grams of radium on a tongue depressor, with cotton held inside the mouth for twenty minutes. The last treatment was August 27. The patient came in October 8, 1918, and was examined and found absolutely well. Has remained well up to the present time—four months.

Case XIII.—Mr. W. E. B., aged sixty-four years. Epithelioma of the gums, floor of mouth, side of tongue and adjacent lymph glands. Admitted March 20, 1918. The trouble started six months before with pain, in the teeth of the right lower jaw. Examination showed extensive carcinoma involving the entire right side of the lower jaw and floor of the mouth, also the glands on the same side.

Three treatments have been given: April 4, seven needle points of 4 mc. each implanted in the lower gum. April 18, two needle points of 5 mc. each implanted in the lower jaw. May 30, 500 mg. in cot inside of the mouth for thirty minutes. By June 27, 1918, there was no evidence of growth. Well at the present time. Duration of cure six months.

Case XIV.—Mr. J. S., aged forty-nine years. Epithelioma with leukoplakia of buccal mucous membrane of the right cheek. Admitted January 14, 1918. Small lump was noticed seven or eight years before. Increased in size gradually. Abscess formed one month before admission. Examination showed patches of leukoplakia and definite epithelial infiltration on the right side; mucous membrane attached to gum involved. Patch also at angle of the jaw about 3 cm. in diameter. Received three treatments inside the cheek. Last treatment April 8. Complete disappearance. Duration nine months.

Case XV.—Mr. D. K., aged fifty-nine years. Epithelioma of the left ear. Admitted January 13, 1916. Specimen removed at Johns Hopkins Hospital. Diagnosis: "Epithelioma spinocellulare malignant." For eighteen months a lump had been present on his ear. Stuck a knife in it eight months before admission and this caused it to grow and ulcerate. Had a similar lump present on the left side of the neck. Examination showed the upper border of the left ear eaten away by sloughing epithelioma, with a foul odor. One hard gland under the ear 1 cm. in diameter. Given six treatments from March to August, 1916, with from 185 to 406 mg. Duration of treatments from ten minutes to two hours. Improvement continued until August 31, 1916; there was no evidence of disease. Never any recurrence. Well at present.

Case XVI.—Mr. F. W., aged forty-seven years. Epithelioma of the cheek. Admitted September 23, 1911. Duration of trouble one year. Examination showed a little raised growth under the eyelid. Length about 1 cm., fairly circular in outline. He received fourteen treatments each of one hour,

with from 32 to 80 mg. In two weeks from the first treatment the growth had disappeared. It has never recurred.

Cases XI, XII, XIII and XIV.—Four cases of localized squamous-cell epithelioma of the mouth, well respectively for six weeks, four months, six months and nine months.

Cases XV and XVI.—Two cases of skin epithelioma cured respectively for seven and three years.

THE TREATMENT OF HODGKIN'S DISEASE

By Curtis F. Burnam, M.D.
Baltimore, Md.

Few morbid processes present greater variations in rate of progress and more protean clinical manifestations than does Hodgkin's disease. Its course may be run in a few weeks or extend over years. Tumefaction may be pronounced and the constitutional disturbance slight; but often the exact reverse is true. The primary lesion may appear in the neck, in the mediastinum, in the abdomen or in all these places simultaneously. The patient may come to us for help for pruritus, with or without skin rash, for a chronic cough or dyspnea, for edema of the leg or for an invasive breast growth. Periods of quiescence and rapid progress alternate in some cases; in others there is a steady march of the disease. Without treatment all recorded cases have ended in death. There is no authentic report of a spontaneous cure, although it is quite possible that such do occur.

For over a period of six years I have treated more than a hundred cases of Hodgkin's disease and malignant lymphoma or lymphosarcoma, which resemble it so closely clinically. I have in preparation a detailed case and statistical report of this series. I shall not, however, describe individual cases in this paper nor give a critical review of the very valuable studies in recent literature, although such a review is almost indispensable to an adequate presentation of the progress being made in the knowledge of the etiology, pathology and

treatment of the disease. I must confine myself to a few practical conclusions drawn from my own experiences.

Diagnosis. Exact diagnosis is necessary as a preliminary to adequate treatment, and such diagnosis rests on the *x*-rays, blood and tissue examinations as well as on a careful general physical examination. In the advanced stages tissue examination is the most reliable single criterion. By this method the typical Dorothy Reed Hodgkin's disease, lymphosarcoma, tuberculosis, syphilis, and the metastatic tumors are readily separable. In very early lesions, it may be impossible to distinguish between lymphosarcoma, Hodgkin's disease, simple hyperplasia and tuberculosis, as they all have more or less the microscopic characteristics of lymphosarcoma.

As a routine diagnostic measure, I advocate the removal of at least two isolated glands. I have seen no spread of the disease as a consequence of this procedure. On the contrary, attempted removal of large masses, as in block dissection of the neck, frequently aggravate the disease. As to whether there is a common etiological cause of Hodgkin's disease and lymphosarcoma, I am unprepared to express an opinion, but until such relationship is shown to exist I feel that they should be considered as separate diseases.

Blood examinations are relatively much less valuable than tissue examinations. A positive finding of Bunting's blood picture does not necessarily mean that the patient has Hodgkin's disease, nor does a negative finding show the absence of such disease; for in 34 cases where the tissue showed positive Hodgkin's disease the blood was positive only in 21 instances and was negative in 13. Moreover, out of 26 cases in which the tissue showed positive lymphosarcoma, 3 cases showed the blood which Bunting has designated as characteristic of Hodgkin's disease. *X*-ray examinations are indispensable in mediastinal and chest cases. They frequently prove marked trouble to exist, when neither the history nor ordinary physical examination suggests it.

TREATMENT. The medicinal treatment of Hodgkin's disease is most unsatisfactory. A few apparent cures from salvarsan and other forms of arsenic are on record. My impression is that when arsenic is forced it tends usually to make the disease progress more rapidly.

Vaccines made from the diphtheroid organism have been extensively used, but with indifferent results. I have had no personal experience with them.

Under the influence of the splendid work of Bunting and Yates there has been a marked revival in favor of surgical removal of Hodgkin's glands—a procedure which had been well-nigh abandoned because of the impression that it was not only useless but harmful. There can be no question, however, that their more satisfactory experiences are due to the invariable and immediate employment of *x*-ray treatment in conjunction with the operative removals. *X*-ray therapy in Hodgkin's disease is not new. It has been widely practised ever since Nicholas Senn's report, now nearly twenty years ago. That the *x*-rays have a very beneficial effect both in ameliorating constitutional symptoms and in reducing tumor there can be no question. Nevertheless, few if any, authentic cures by this method are on record.

While many of our patients had been treated both operatively and with the *x*-rays, I have made use only of radium, combining it in some cases with rest in bed, forced feeding and iron in the form of Blaud's pills. Most of the patients were in advanced stages of the disease. Many of them were acute cases—some of them practically *in articulo mortis*. I have excluded from consideration only those cases in which the disease was limited to the tonsil and where it is difficult to classify as Hodgkin's, lymphosarcoma or hyperplasia. Most satisfactory results have been obtained in this group, which doubtless contains instances of Hodgkin's disease.

In general, I find that more satisfactory results are obtained in cases in which the tissue-examination shows lymphosarcoma than where it shows Hodgkin's disease.

Furthermore, in Hodgkin's disease better results are obtained when the characteristic polymorphonuclear leukocytosis is not present. Chronic cases are more favorable than acute. Intensive prolonged exposures, very satisfactory in some chronic cases, are quite unsuitable in acute cases.

In a chronic case limited to one set of glands a single exposure may lead to a cure, which has, in one case, extended over five years. Heavy exposures in acute Hodgkin's disease are usually followed by rapid reduction in the size of the gland masses, but with no corresponding improvement in the blood or the patient's general condition. In these acute cases rest in bed, forced feeding and mild fractional radiation are indicated. This method of treatment we have used for only about one and a half years, and are consequently unable to report on the results. Acute cases treated more than one and a half years ago with the heavy-dose method are dead with the exception of Miss R. F., aged eighteen years. This girl was admitted to the hospital on April 6, 1916, with high fever, a great mass in the abdomen, another in the chest, extremely emaciated and apparently dying. Under treatment there was apparent complete cure lasting for more than one and a half years. There was then an extensive abdominal recurrence, which is at the present time yielding to treatment.

Rest and abundant feeding are of great importance in the chronic cases. Heavy work and exposure readily lead to relapse. The most unsatisfactory chronic cases are those with very little glandular enlargement, but with marked constitutional symptoms and changes in the blood. In the two or three cases of this kind met with there has been but little amelioration of the patient's condition following treatment, contrasting with the general improvement noted in patients even when apparent cures have not been obtained.

In every case where the infection is limited to isolated groups of glands, such as one side of the neck and axilla, a complete disappearance of the glands can be looked for with confidence. Where the disease is extensive, especially in

mediastinal cases, this is more uncertain. In chronic Hodgkin's disease the disappearance of the gland masses is almost invariably accompanied by improvement in general health, gain in weight, disappearance of pruritus and the return of the blood to a normal appearance.

Technic. Treatment must be so planned that adequate radiation will be applied to all parts of the body affected by the disease. At the same time great care must be taken to avoid injury of normal structures, and this applies particularly to the skin. It is probably desirable even in early localized cases to radiate all the regions of the body in which Hodgkin's disease is likely to appear. There is apparently no effect on gland masses when not directly radiated.

The guide to treatment is to be found in the effect on the gland masses, the blood, the appetite and the general health of the individual case. No fixed plan of treatment that can be carried out as a routine is possible. It may take many times the dose that is quite effectual in one case to cause a gland disappearance in another case. One patient is markedly upset with loss of appetite, fever and general malaise by a treatment which in another causes none of these disturbances. I should say that several hundred milligrams is a workable minimum for treatment. In a few cases we have used as high as fifty gram hours in a single treatment. Gamma radiation at a distance from the surface varying from one and a half to five inches, and with the length of the exposure inversely proportional to the amount of radium employed, is the method which has been used.

General Results. The reduction of gland masses, amelioration of discomforts and improvement in general health already referred to occur in most cases and sometimes are most striking in the very advanced stages. It seems to me that we may confidently look for permanent cure in an increased proportion of these patients with further improvement in our methods of treatment. It is, of course, impossible to fix any definite time-limit as an indication that

Fig. 1*a*.—Miss K. A. D. (1897). Hodgkin's disease with general involvement and marked pruritus. Photograph taken September 8, 1915, before treatment.

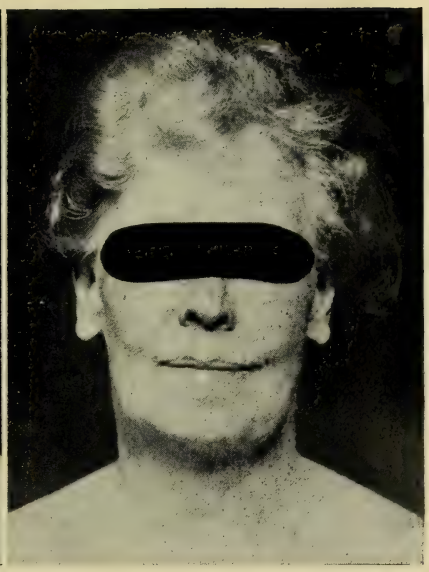


Fig. 1*b*.—Miss K. A. D. (1897). Photograph taken October 11, 1915, after three radium treatments. Complete disappearance of all evidence of trouble. Well at present. Cure has lasted more than three years.

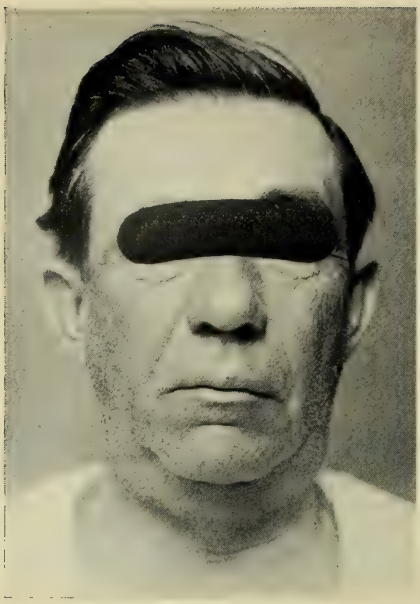


Fig. 2*a*.—Mr. F. G. (2399). Hodgkin's disease. No tissue. Blood not characteristic. Photograph taken April 6, 1916, before treatment.

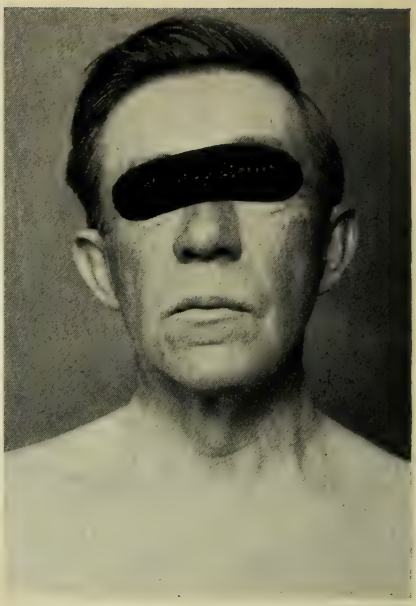


Fig. 2*b*.—Mr. F. G. (2399). Photograph taken April 17, 1917, after five treatments. No treatments since. At present no evidence of trouble. Well for nearly three years.

Fig. 3*a*.—Miss D. E. (2290). Chronic Hodgkin's disease with extensive involvement of skin and clavicle, and infiltration of breast. Photograph taken February 23, 1916, before treatment.

Fig. 3*b*.—Miss D. E. (2290). Photograph taken October 17, 1916, after ten exposures to radium. Still under treatment. At present her arm is greatly swollen but her general health is good.

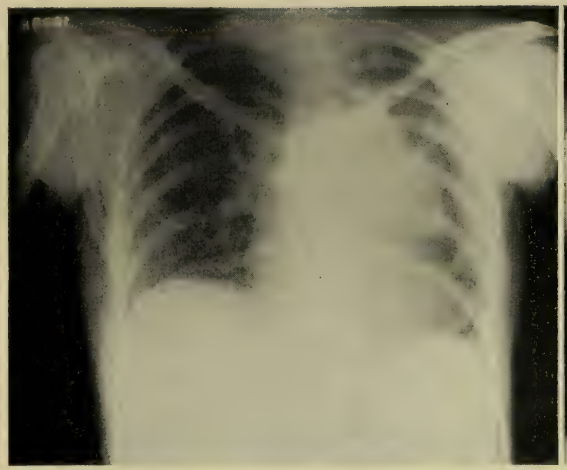


Fig. 4*a*.—Mrs. R. L. (126). Lymphosarcoma of mediatinum and neck. Diagnosis from tissue. Roentgenogram taken June 14, 1913, before treatment.

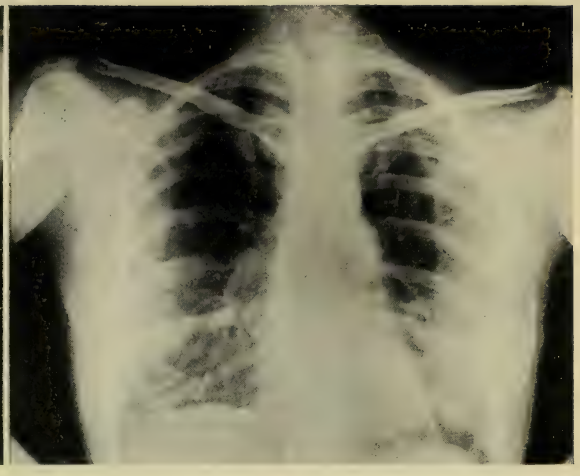


Fig. 4*b*.—Mrs. R. L. (126). Roentgenogram taken May 4, 1917, after eight treatments. After three treatments the chest was negative. In the spring of 1917, a recurrence appeared which was dissipated by further treatment. Perfectly well ever since.

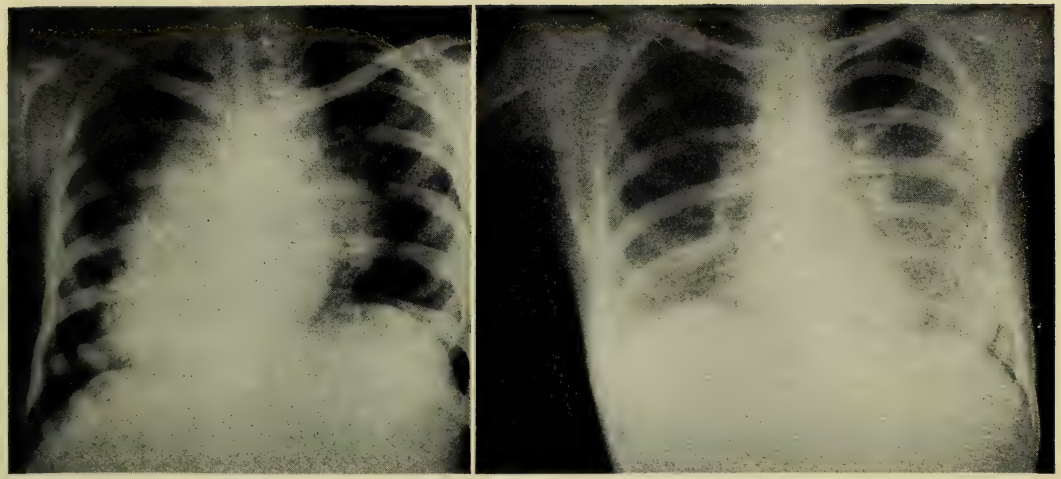


Fig. 5*a*.—R. F. (2471). Acute Hodgkin's disease. Patient was extremely ill with huge masses in neck, chest and abdomen. There was high fever and marked emaciation. Roentgenogram taken April 7, 1916, shows chest condition before treatment.

Fig. 5*b*.—Miss R. F. (2471). Roentgenogram taken March 15, 1918, shows improved condition two years later after a series of radium treatments. General condition at present satisfactory, although there was a recurrence in one and a half years. Still under treatment.

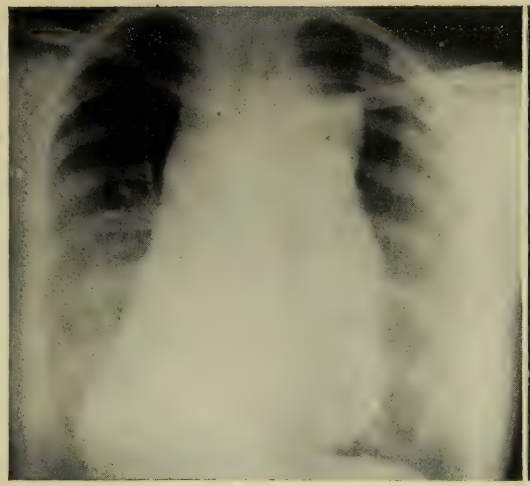


Fig. 6*a*.—Miss L. L. (3971). Mediastinal tumor with tissue and blood both characteristic of Hodgkin's disease. Roentgenogram taken May 23, 1918, before treatment.

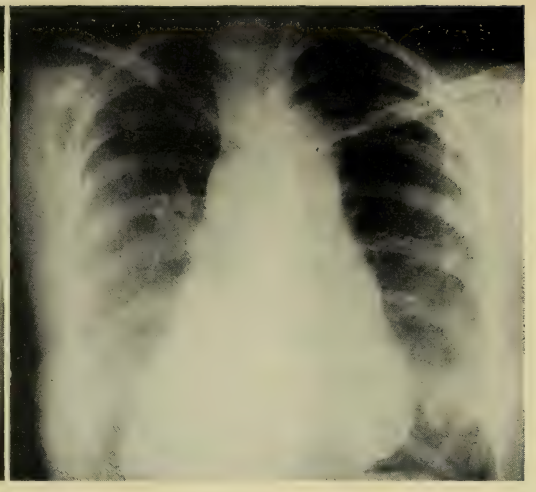


Fig. 6*b*.—Miss L. L. (3971). Roentgenogram taken October 18, 1918, after four radium treatments. It was impossible to give heavy dosage in this case, so frequent, light treatments were used. Still being treated.

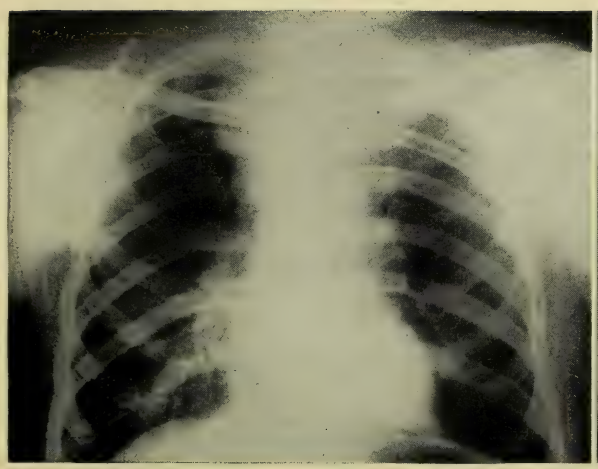


Fig. 7*a*.—Mr. C. S. B. (2255). Hodgkin's disease with cervical, mediastinal and axillary involvement. Tissue and blood both characteristic. Roentgenogram taken February 7, 1916, before treatment.

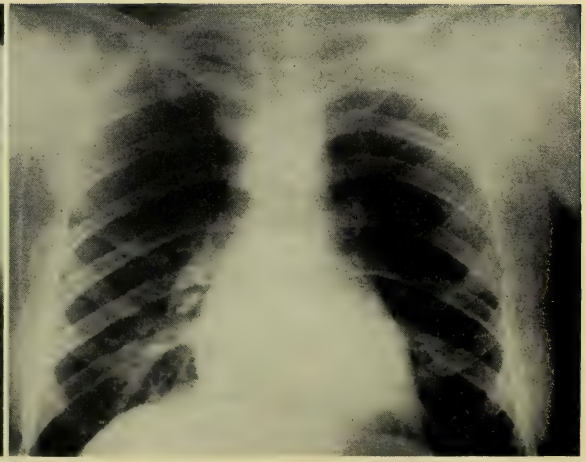


Fig. 7*b*.—Mr. C. S. B. (2255). Roentgenogram taken March 6, 1917, after three treatments. Patient has been well for nearly three years.

the disease will not recur. I recently had the experience of an extensive abdominal recurrence and death in a patient apparently well for four years from a pharyngeal and neck lymphosarcoma.

Excluding all patients in whom apparent cure has been less than three years, we have had, when lymphosarcoma was diagnosed, two cases perfectly well and without signs of trouble for more than five years—one an extensive neck case, and one an abdominal case. Four cases have been apparently well for over three years— one with pharyngeal and neck involvement, one with mediastinal, one with tonsil, neck and groin and one with neck and axilla.

Excluding all patients in whom apparent cure has been less than three years, we have had when Hodgkin's disease was diagnosed, one patient with mediastinal and neck involvement well for four years and two cases well for over three years. One of these had neck, axilla, groin and iliac glands; the other groin, axillary, neck and mediastinal involvement. While there is no objection to the complete surgical removal of a localized group of glands, if it is followed by radiation it does not seem to me that this is necessary.

TREATMENT OF TUMORS OF THE UPPER JAW WITH THE CAUTERY: A PRELIMINARY REPORT

By Joseph Colt Bloodgood, M.D.
Baltimore Md.

The employment of the cautery in the partial or complete removal of malignant tumors is an old method. My own experience during the past five years has demonstrated that we have much to learn as to the details of its application.

When we compare the results of operations for the removal of tumors of the upper jaw with the knife alone with the results of the removal of identical tumors with the cautery, we find that we have distinctly decreased the mortality, and when we have accomplished cures it has been with less mutilation. That the actual number of cures has been increased cannot be demonstrated at the present time.

The reduction in mortality is associated with the employment of local anesthesia alone, or in combination with light chloroform general anesthesia.

In many instances it is safer to remove the disease involving the upper jaw in stages. It is remarkable how much can be done under local anesthesia alone. When a general anesthetic is necessary, chloroform, in my experience, seems to meet the indications best. It does not interfere with the use of the cautery. It is the best anesthetic when operations are performed in the region of the oral cavity. It should never be pushed to complete narcosis. The patient

has no memory of pain, and although he is so lightly under the influence of the anesthetic that all reflexes are active, he remains more or less quiet.

When chloroform is not pushed to complete narcosis the danger seems practically eliminated, and the operations can be repeated at intervals of three or four days. In some of my cases there have been as many as fourteen operations.

The surgeon should hold himself responsible for the anesthetic and direct its administration. In all of my cases the pulse and blood-pressure are recorded every five or ten minutes. The chloroform is rarely administered longer than one hour. When the cautery instead of the knife is employed, the operation can be discontinued at any moment.

The duration of the operation and the number of operations largely depend upon the general condition of the patient and local extent of the neoplasm.

When the cautery is employed it is possible to remove the tumor piecemeal and to destroy from tumor tissue into the surrounding healthy tissue without danger of dissemination, while with the knife one must give the tumor tissue a wide margin and remove the entire mass *en bloc* at one operation.

In tumors involving the upper jaw the complete excision with the knife, when the disease is extensive, always sacrifices more healthy tissue than when the cautery is employed, and the danger of this single extensive removal with the knife is greater than the removal in stages by the cautery.

In the removal in stages with the cautery it is also possible to have a pretty positive microscopic control as an indication that enough has been done. One also learns quickly to distinguish granulation tissue in which there is no tumor tissue from that which still contains tumor tissue by its gross appearance which can be checked by the removal of a piece for microscopic study with the cautery.

The new growth should be attacked with the cautery from two points. One should burn the tissue at the border of the tumor. This not only destroys the infiltrating area,

but excites in the healthy tissue beyond a granulation tissue which of itself is largely protective against secondary invasion, at least during the period of complete removal. The second attack should be upon the new growth itself, if possible, from the center out.

These two methods of attack are varied according to the size of the neoplasm and its local growth and the anatomical character of the surrounding uninvolved tissue.

I find that I am helped by a thorough knowledge of the character of the local growth and its microscopic appearance based upon a thorough study of similar cases recorded in the Surgical Pathological Laboratory of the Johns Hopkins Hospital.

Three cases will be reported in detail. Case I was an adenocarcinoma arising in the left antrum with metastasis to the glands of the neck, apparently well two years and nine months after operation. (See Figs. 1 to 4.) Case II was a fibromyxoma of the alveolar border of the left upper jaw involving the antrum and cheek, apparently well one year and nine months after operation. (See Figs. 5 to 8.) Case III was a primary carcinoma of the right antrum, not cured. (See Figs. 10 and 11.) Other cases treated by the method here described are not reported either because the treatment is still incomplete or the time since the last operation is too short.

This paper must be looked upon as a preliminary report only.

Case I. Pathological No. 19078.—Mrs. J. M. Jaw. Antrum. Adenocarcinoma. Metastasis to the glands on the left side of the neck. Removal of the tumor in the antrum with an actual cautery in two operations. Complete excision of the glands four months later. Result. May, 1919—two years and ten months after the removal of the glands—no signs of recurrence nor general metastasis. (See Figs. 1, 2, 3 and 4.)

Up to the time of this case I had never observed a cure

of a carcinoma of the antrum even after the most extensive resection of the upper jaw. This is the first case in which the cautery was employed. Although it is less than three years since the removal of the metastatic glands, the probabilities of a cure are excellent, because in our previous observations there are no examples of such a long interval without signs of local recurrence.

This patient, a white female, aged thirty-eight years, was referred to me in March, 1916, by Dr. J. H. Crisler, of Memphis, Tenn. The symptom of onset was swelling of the left upper jaw of two months' duration. The condition had been diagnosed an abscess, but an incision through the hard palate had revealed no pus. Two molar teeth on the left side had been extracted.

Examination. The bulging of the face in the region of the left antrum, as shown in Fig. 1, is rather characteristic of a primary lesion of the antrum, either sarcoma or carcinoma. There was pain in the region of the hard palate, but no bulging. This, as a rule, is a later sign than the bulging of the face. The incision in the hard palate had not healed. There was no exophthalmus. There was no evidence of nasopharyngeal polypi and no obstruction of the left nares except that due to a bulging of the antrum wall. The *x*-ray showed a cloudiness of the left antrum. The other sinuses were apparently clear.

The Wassermann was negative. There was no anemia. The leukocytes were 14,000, with a slight increase of the neutrophiles, 74 per cent.

Clinical Diagnosis.—Practically only sarcoma and carcinoma produce this rapid bulging in the face. The benign nasal polypi rarely produce this bulging except when the duration is more than two years.

Operation.—March 11, 1916. Ether was given by the intrapharyngeal method by Dr. Stewart. Novocain was infiltrated into the skin. From the palpation of the swelling of the face and from the evidence of destruction of bone in

the *x*-ray, I felt quite positive that the anterior bony wall of the antrum was destroyed by the new growth. For this reason I made the skin incision with the electric knife cautery and exposed a ragged opening in the anterior bony wall of the antrum the size of a 50 cent. piece. The tumor was first burned in its center with both the electric and the Percy cautery. Then the opening in the antrum was enlarged by first burning the bony shell and then biting the bone away with a pair of scissors. The tumor did not bleed when burned with the cautery. It was the size of an egg and filled the antrum cavity. The bony wall toward the orbit and the hard palate was apparently not destroyed. With the electric knife cautery used like a periosteal elevator, I cauterized and destroyed the tissue between the tumor and its surrounding bone and soft tissue. Especially the septum between the tumor and the nose was thoroughly cauterized. However, all the tumor tissue was not removed. The wound was packed lightly.

The intrapharyngeal anesthesia with ether was not so satisfactory as our later experiences with light chloroform, as the ether had to be continuously removed for the employment of the cautery.

When I exposed this tumor with the cautery I did not remove a piece for frozen section, because the destruction of the bony wall and the appearance of the tumor were sufficient to make a diagnosis of malignancy.

When the charred tumor was removed, we could still recognize fine, gray, granular areas in a fibrous stroma—the gross picture of an alveolar neoplasm—probably carcinoma.

The microscopic section (Fig. 2) demonstrates that we are dealing with a rare type of adenocarcinoma which apparently originates from adenomatous polyps of which Fig. 3, from another case, is an example. This form of carcinoma of the antrum is much less frequent than the carcinoma spinocellulare.

Second Operation.—March 16, 1916, five days after the first operation, with the same method of anesthesia, the cavity was again thoroughly burned with both the electric and the Percy cautery until the growth was apparently all destroyed or removed. At this operation we found that the tumor had apparently arisen between the nose and the antrum. It had also destroyed some of the bony wall separating the antrum from the orbit. There was uninvolved mucous membrane in the upper and outer portion of the antrum cavity. The nasal septum was not completely removed.

The wound rapidly filled with healthy granulation tissue. The patient had very little discomfort from the operation and made a rapid recovery. It was my opinion that the glands should not be removed until there had been a further observation as to local recurrence.

It is important to note that in the healing of the wound most of the bony wall of the antrum cavity was discharged as sequestrum, and there was nothing between the cavity and the mouth but the mucous membrane of the palate.

Third Operation. July 8, 1916, four months after the second operation, the patient returned because of palpable glands in the region of the left submaxillary gland which had been observed by Dr. Crisler. The operation consisted of the complete excision in one piece of the submental, submaxillary and subparotid lymph glands and the submaxillary salivary gland. This was done with the cautery under novocain and light drop ether. The only gland involved in gross and microscopic examination was the submaxillary lymph gland. This gland was the size of a 25 cent piece. Its cut surface was white and somewhat myxomatous, studded with yellow dots and lines. The section resembled that of the primary tumor.

Remarks. Fig. 4 shows the result in March, 1918—two years after the primary operation on the antrum and a little less than two years after the excision of the glands of the

neck. The patient wears a small piece of white gauze over the small opening, which is a very slight deformity. She is planning to return this summer for a plastic operation, which has been deferred chiefly to watch for local recurrence, as the most important result to obtain in a case of this kind is a cure. The openings at the present time are much smaller.

It is my opinion that this case suggests a method of successfully attacking a primary lesion of the antrum. There was no necessity in this case for even the short delay of two months. The primary swelling at the onset was sufficient to indicate an exploration of the antrum. In very early cases the exploration to obtain a piece for microscopic study could be made through the nose, but an exploratory incision through the face produces practically no scar and gives a far better view of the contents of the antrum. When the clinical and the *x*-ray diagnosis are as positive as in this case, this method of exploration should be chosen.

Case II. Pathological No. 21862.—Master F. C. Jaw. Region of the left antrum. Fibromyxomatous tumor, perhaps sarcoma involving the alveolar border and destroying the anterior wall of the left antrum. Removed in three stages with the cautery July, 1917. Well April, 1919, almost two years later. Illustrations, Figs. 5, 6, 7, 8 and 9.

This patient came under my observation April 28, 1917, having been referred to me by Dr. E. T. Negendank, of Wilmington, Del.

The patient was a white boy, aged eleven years. The present trouble was of seven weeks' duration. First there was pain in the region of the upper molar on the left side, thought to be due to the appearance of the second molar. Then the swelling came on the outer surface of the alveolar border of the left upper jaw about a molar tooth. The dentist looked upon this as a gum boil. I emphasize this, because many of my dental colleagues disagree with my observation that the first symptom of a malignant tumor may

Fig. 1, Case I.—Pathol. No. 19708. Primary adenocarcinoma of left antrum. White female, aged thirty-eight years; visible swelling shown in photograph of two months' duration.

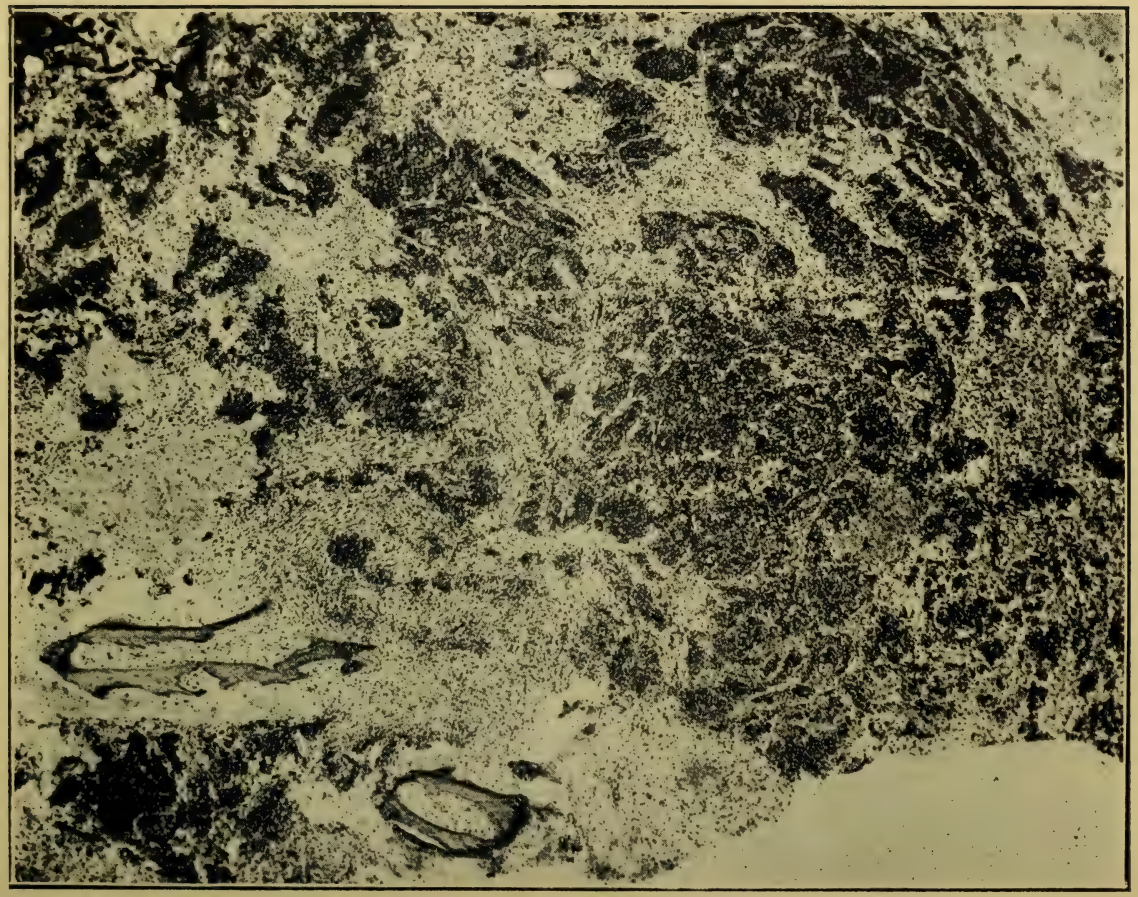


Fig. 2, Case I.—Pathol. No. 19078. Microscopic picture, low power, of adenocarcinoma of antrum removed with cautery (see Fig. 1). The section shows some spicules of bone, demonstrating that the tumor had infiltrated beyond the bony shell.

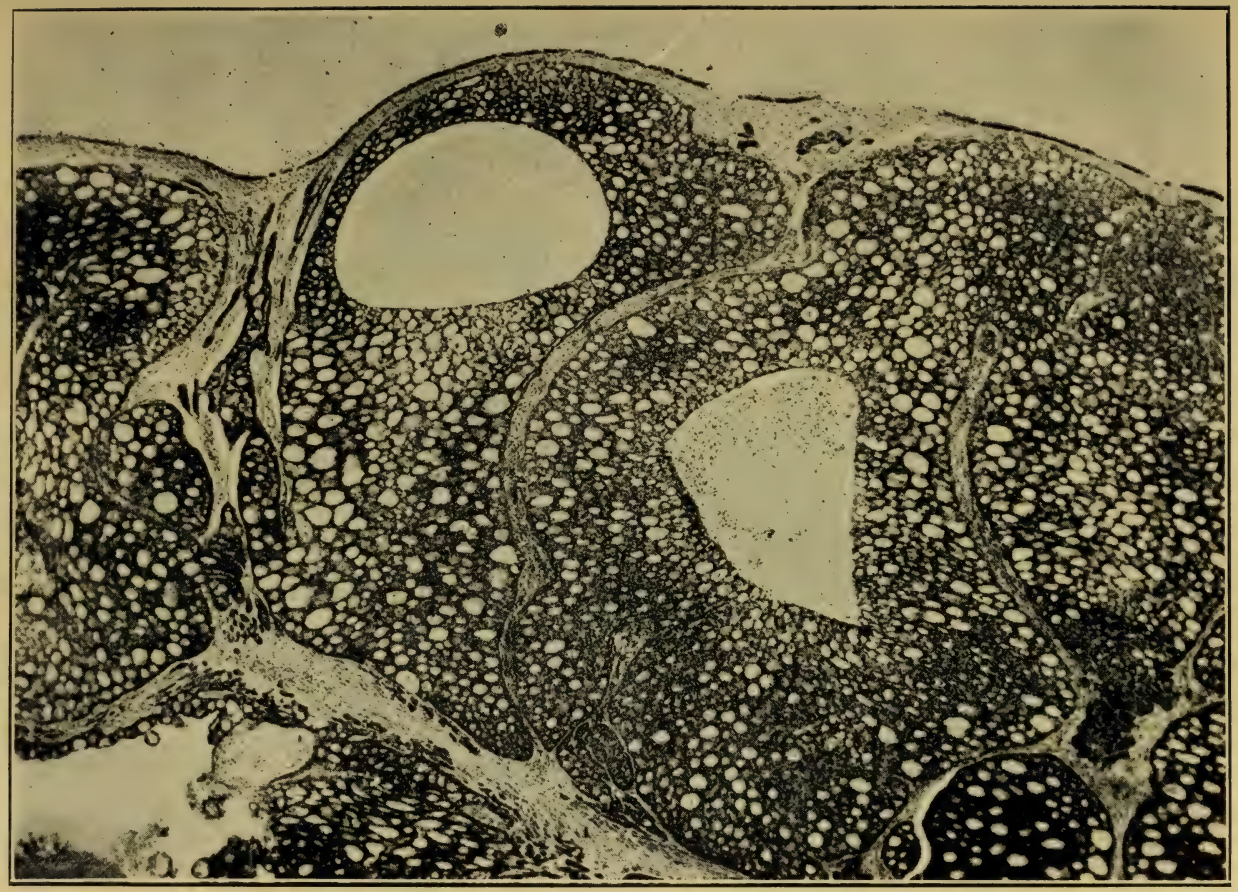


Fig. 3.—Pathol. No. 18096. Microscopic picture (low power) of benign adenoma in a polypoid growth filling the antrum. Compare this with Fig. 2, adenocarcinoma.

Fig. 4, Case I.—Pathol. No. 19078. The result in Case I, two years after the removal of an adenocarcinoma of the antrum and one year and eight months after excision of metastatic glands of the neck. This patient is apparently well May 1, 1919. (See Figs. 1 and 2.)

Fig. 5, Case II.—Pathol. No. 21862. Fibromyxomatous tumor (sarcoma?) originating from the alveolar border of the left upper jaw breaking into the antrum cavity and infiltrating the cheek. Removed by the cautery in three stages July 11 to August 19, 1917. Well April, 1919.

Fig. 6, Case II.—Pathological No. 21862. The result showing the open wound after the treatment of the cases shown in Fig. 5.

Fig. 7, Case II.—Pathological No. 21862. The result March 15, 1919, in case illustrated in Figs. 5 and 6.

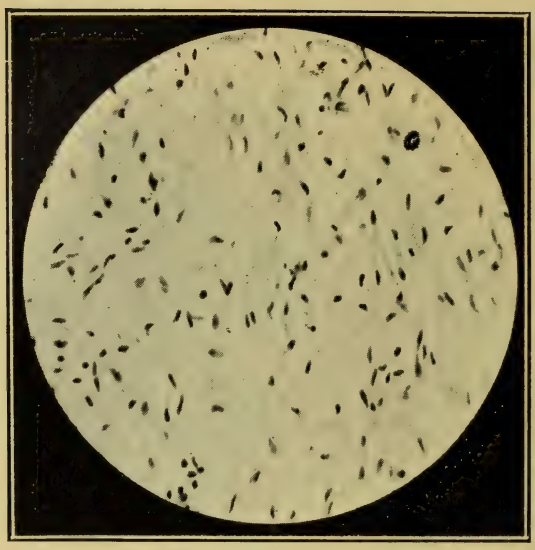


Fig. 8, Case II.—Pathological No. 21862. Microscopic picture (high dry power) of a fibromyxomatous area of the tumor removed from the upper jaw (see Figs. 5, 6 and 7). There is no evidence of sarcoma in this section.

Fig. 9, Case II.—Pathological No. 21862. Microscopic view of a more cellular area in the fibromyxomatous tumor. (Compare with Fig. 8.)

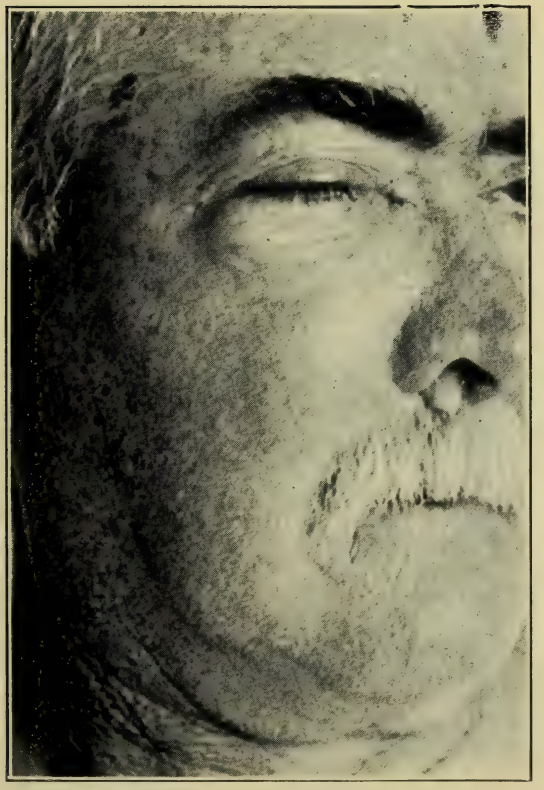


Fig. 10, Case III.—Pathological No. 21917. Carcinoma primary in the right antrum.

Fig. 11, Case III.—Pathological No. 21917. Carcinoma primary in right antrum showing the skin flap and wound after two treatments with the cautery.

resemble a gum boil. The patient was referred to a surgeon, who made an incision over the gum boil and reports that he found a small abscess, but exposed tissue which did not resemble the normal. In my opinion this tissue was the myxomatous tumor, situated on the alveolar border and beginning as a periosteal growth.

Following the cleansing of the cavity the severe pain and swelling somewhat subsided. Later another surgeon removed a molar tooth and exposed what he called a cauliflower growth. Following this two anterior teeth fell out, and there was some sloughing of the tissue in the open wound. A few days after this operation the pain increased and the swelling of the alveolar border extended to the face. The patient has had a number of *x*-ray treatments.

Examination. Fig. 5 shows the swelling on the left side of the face. The changes in the skin on both sides of the face are apparently due to an *x*-ray burn. The patient is anemic from pain and loss of sleep and difficulty in eating. He is extremely nervous and apprehensive on account of the seven weeks of discomfort and the numerous interventions.

There is no obstruction to the left nares. There is no exophthalmus, no pain in the ear, and no change in hearing. The swelling of the cheek extends down over the lower jaw and is apparently due to a growth between the mucous membrane and muscle. Examination of the mouth was difficult because it was painful and the patient was very nervous. There was present in the left upper jaw the last molar and the two incisors. The alveolar border of this defect was occupied by a projecting smooth mass, covered, except in some places, with normal mucous membranes. Occupying the defects in the mucous membrane was granulation tissue. The mucous membrane to the inner side of the teeth and of the palate was uninvolved, as also was the mucous membrane of the cheek, but a tumor mass could be felt beneath the mucous membrane of the cheek. The *x*-ray showed a cloudiness of the left antrum. The other

sinuses were clear and there was apparently destruction of the anterior wall of the antrum cavity over a larger extent than in Case I, Fig. 1.

The age of the patient would exclude a carcinoma. The more common tumor to arise along the alveolar border and grow into the antrum or to arise in the antrum and break through and project from the alveolar border, is a fibromyxoma, a type of tumor which can be cured by local removal, but which generally recurs if cut into, enucleated or shelled out, because bits of tissue are very apt to be left behind and to grow very rapidly even as transplants.

The extent of this tumor would have forced an operation with the knife so radical that the resultant defect even when covered with a successful plastic would have been unsightly. For this reason I decided first to explore, then to give the *x*-ray a further trial, and then to attack the tumor with the cautery.

First Operation. On May 1, 1917, under cocain, I explored just below the orbital ridge, exposed a thin shell of bone, demonstrating that the tumor had not destroyed the bone in this area. Removing this bone, there appeared the mucous membrane lining of the antrum, which, when incised, contained a little clear mucoid fluid. With the finger I could feel the soft tumor below and between this antrum cavity and the nose. The communication with the nose had been closed by the tumor growth. The tumor had either originated as a periosteal growth along the alveolar border, broken through the bony wall of the antrum, or had its origin in the tissue between the mucous membrane and the bony capsule of the antrum and had broken through along the alveolar border. A small drainage tube was placed into this cavity. This relieved the discomfort, and under *x*-ray treatment the swelling somewhat subsided. In the latter part of June, six weeks later, when the patient was apparently doing well, there appeared a definite erysipelas. The redness and swelling lasted about one week. But after

the signs of erysipelas had disappeared, the tumor began to grow. For this reason operation was decided upon.

Second Operation. July 11, 1917, under light chloroform anesthesia, I excised a zone of skin about the size of a silver dollar over the cheek. The tumor had infiltrated into this skin. I then burned the center of the tumor with both cauteries and burned between the tumor and the surrounding tissues with the electric knife cautery, removing some of the tissue for microscopic examination. This fibromyxomatous tissue, on account of its watery and mucoid character, is very resistant to destruction by heat, and although we worked an hour and one-half, much tumor tissue, especially in the periphery, was left behind. There, however, was a huge cavity lined by charred tumor tissue. I could feel that the bone of the hard palate, the bony wall of the orbit, were intact. Most of the anterior bony wall of the antrum had been destroyed. The mucous membrane of the antrum had prevented the tumor from entering the orbit and it had not infiltrated far into the temporal fossa or toward the ramus of the lower jaw. It extended up the antrum between the nose and the eye, on the alveolar border to the second canine, posterior to the last molar and down the cheek between the mucous membrane and the skin almost to the lower jaw. This infiltration was later demonstrated by microscopic study. Tumor tissue was present both on the inside and the outside of the anterior bony wall of the antrum, suggesting that it had originally been a primary periosteal growth.

The condition of the wound fourteen days after this operation is shown in Fig. 6. Following this operation the boy was relieved of pain. He immediately began to sleep and to gain in weight.

Two further cauterizations under chloroform were made, the last August 19, 1917, when apparently all the tumor tissue had been removed. This was confirmed by microscopic study.

To demonstrate the apprehension of this patient and his extreme nervousness, especially in relation to an anesthetic, it is interesting to note that at the first anesthesia with chloroform starting on the wheel chair outside the operating room, it required three-quarters of an hour to render the patient sufficiently unconscious to place him on the operating table, and I must here acknowledge my indebtedness to Drs. Cummings and Long for their patience and efficient assistance.

After the last cauterization we were able to save the last molar tooth and two incisors. There was an opening between the cavity and the mouth along the alveolar border between the molar and the incisor. This wound gradually healed. The small resulting defect is shown in Fig. 7, taken March 29, 1919, one year and eight months after the last operation. We see between the skin edges mucous membrane, the posterior upper molar. The small opening into the oral cavity admitting a slate pencil anterior to this molar is not seen in the picture.

Despite this boy's frightful experience, he is now normal in every way, strong mentally and physically, and is very anxious for the plastic operation, which will be performed this summer. The operation was delayed to give the natural healing processes time to reach their utmost limits.

The tumor (Figs. 8 and 9) is a fibromyxoma. I am inclined to think that the cellular areas in Fig. 9 are due to reaction to infection or the cautery and should not be interpreted as sarcoma.

From a very large experience with tumors of the upper jaw, I feel confident in concluding that in this case by the methods employed we have accomplished a cure with less mutilation and less risk of an operative mortality than if we had attempted the complete excision with the knife at one sitting.

Case III. Pathological No. 21917.—Jaw. Antrum. Carcinoma, primary. Operation: Novocain-chloroform.

Treatment of tumor with cautery on five occasions from July 26 to October 2, 1917. Death on February 10, 1918, from nephritis.

This patient, D. E. F., was a white male, aged sixty-seven years. He was referred to me by Dr. W. F. Twigg, of Cumberland, Md., July 20, 1917. His occupation was that of a locomotive engineer. Following a severe cold six months previously, he found that he had obstruction to breathing through the right nostril which he had never before observed to persist so long. He was examined one month later by a nose and throat specialist, but nothing was done except an attempt to dilate the obstructed nostril. Four months after onset, two months before he came to me, a piece of the tumor was cut out through the right nostril. This piece of tissue was lost. The obstruction of the right nares continued. Swelling of the face and bulging downward of the hard palate had been present for six weeks. The tear duct into the nose had been closed for five weeks.

Examination.—The external swelling is shown in Fig. 10. The mass projecting from the right nares is a mucopurulent secretion. A partial closure of the right eye is due to infiltration of tumor tissue between the lower eyelid and nose. There is a bulging of the hard palate. The right nares is plugged with a soft granular mass entirely different from a polypous growth and not very vascular. The *x*-ray shows cloudiness of the antrum.

The probable diagnosis made in this case, on account of the age of the patient, was primary carcinoma of the antrum.

First Operation. Novocain and light chloroform anesthesia. The skin incisions were made with the cautery, because we could tell by palpation that the tumor had broken through the anterior bony wall of the antrum. These incisions exposed a solid, firm, granular mass filling the antrum cavity. The entire anterior bony wall of the antrum was destroyed. The tissues were very resistant to the cautery. In view of this evident infiltration beyond the

confines of the antrum, destruction of the tumor was begun from the center outward.

Fig. 11 was taken on August 4, 1917, nine days after the first cauterization and four days after the second. It shows the skin flap sutured in place. Cauterization had to be done carefully, because of the resistance of the tissue and because the patient was not in good general condition. The urine showed albumin and casts and the blood-pressure was 190. By August 30, about one month later, after about six cauterizations, the entire zone of the antrum had been destroyed, but there was still tumor tissue extending upward between the orbit and the nares and outward toward the temporal fossa. At these operations it was demonstrated that the bony shell had been almost completely destroyed by the carcinoma and the tumor had infiltrated beyond in many directions. There was no cauterization between August 30 and October 2 because of the general condition of the patient. At this time there was still evidence of disease. It could be recognized in the gross and was confirmed by the microscopic section. After the cauterization on October 2 he was given radium treatment on October 5 by Dr. Janeway, of New York.

The patient died with symptoms of nephritis February 10, 1918, five months later. The wound, however, seemed filled with healthy granulation tissue, but I am confident that the disease was still present.

Conclusions. I have had a large experience with carcinoma of the antrum of this type. It is a much more common pathological type than in Case I reported here. In this series there is not a single permanent cure after the most radical excision of the upper jaw. As in this case, so in the others, the growth had broken through the bony shell and infiltrated tissue beyond the zone of possible excision with the knife. In all these cases, except those with a long history of nasal polypi, the duration of the symptoms has been short—usually less than nine months. In this case the

condition had become inoperable within six months. In all of these cases it would appear that a careful examination in the early days or weeks after the onset of the first symptoms would have disclosed an involvement of the antrum.

I am impressed from my observations in Case I than an exploration of the antrum through the face in the early stage of the disease and the destruction of the growth in the antrum with the cautery offers a hope of a permanent cure even in the more malignant types of carcinoma and sarcoma. But in Case III the disease had infiltrated beyond the possibility of destruction with the cautery, and as yet I have no evidence that the *x*-rays or radium offer more hope than some temporary delay in the local growth and ultimate death.

The only advantage that the cautery seems to offer over eradication of a cancer in the early stage is that the operation itself is less severe than the complete excision with the knife and is less mutilating.

Also, when cancer in this situation is removed by the knife, there is great danger of breaking into the tumor and bringing tumor tissue in contact with uninvolved tissue. My observations lead me to conclude that such an occurrence explains many of the local recurrences. This danger is less, or entirely eliminated, when the cautery is employed.

DISCUSSION

Dr. James E. Thompson, Galveston, Texas.—I have listened to Dr. Bloodgood's paper with a very great deal of interest. It has always appeared to me that in handling questions like this there has usually been too much generalizing and too little particularizing. We have been handed a lot of statistics of sarcomata and cancers without correlation between the pathological features and clinical symptoms which has resulted in a mass of material that was absolutely valueless to anybody who wished for accurate information.

It has always appeared to me that malignant disease and tumors generally should be treated regionally in the same systematic manner in which Dr. Halsted treated cancers of the breast in his epoch-making paper, which appeared about fifteen years ago. In this there was a clear correlation between pathology and prognosis, which has never been equalled since. We were told in a very definite way what to expect when the disease had infected certain parts and what to expect when certain parts were free from disease. Dr. Bloodgood has presented to us not only the gross pathology of these tumors, but the exact microscopic features, and one can form a clear idea as to prognosis in no other way. I was particularly impressed with his remarks about the frequency of carcinomata arising from the antrum of Highmore. A great deal of loose description has crept into literature concerning sarcoma of the antrum. Anyone who has made careful examinations of tumors removed from the antrum of Highmore knows that carcinomata are much more frequent than sarcomata. In the museum of the University of Texas we have at least six cancers for one sarcoma.

Lymphatic metastasis is not common in cancers, but it occurs frequently enough to make it advisable to remove in a systematic manner the glands of the neck, without draining the areas involved. It must also be remembered that periosteal sarcomata of the jaws are occasionally attended with metastases of the lymphatic glands. There is in our museum an excellent example of the spindle-celled sarcoma of the lower jaw with widespread metastases in the glands of the neck.

As regards mortality, I can agree thoroughly with what Dr. Bloodgood has stated. He has never had a cure after excision of the jaw for an antral tumor of a sarcomatous or cancerous nature. I believe that the prognosis in cases of sarcoma of the jaw depends almost entirely on the kind of sarcoma. Round- or spindle-celled sarcoma are very malignant, and there is probably not a single case on record of cure after removal of round-celled sarcoma of the antrum. In low grades of sarcoma cures are not uncommon. In 1892 I removed the left side of the upper jaw for a case of chondromyxosarcoma of the antrum that had been growing for four years. The operation was absolutely successful and the patient is alive at the present time. Microscopically the growth was of a very low grade of malignancy and contained very few embryonic elements. Another growth of low grade malignancy which arose from the sphenomaxillary

fossa and from the contiguous surface of the zygomatic fossa was removed by me in 1895. This was also a low grade of sarcoma containing scattered spindle cells and a large amount of fully formed connective tissue. This patient is also alive at the present time. As against these two cases I have no ultimate cures in tumors of high malignancy.

Dr. William B. Coley, New York City.—In view of what Dr. Bloodgood and Dr. Thompson have said about the great rarity of malignant disease of the antrum, I should like to put on record some cases that have come under my observation and a few that came to me after having been treated by other men.

Dr. Bloodgood has told us that the knife alone very rarely cures gross malignant disease of the upper jaw. If we had no better method than the cautery, I would urge its use with the result of considerable mutilation which the pictures make evident. We had a better method even before we began to appreciate the value of radium and learned how to use it. I have had a number of cases which were apparently cured by the toxins alone where they had advanced beyond operation. I recall the case of a boy, who came under my observation in 1908, with a tumor of the upper jaw of the giant-celled type. He had previously had a partial removal of the tumor by curetting. He was given the toxins for a considerable time by a Buffalo physician, recovered, and is well at the present time.

The next patient came to my clinic from the eye and ear hospital, after having had three operations for a tumor of the nasopharynx, later involving the superior maxilla, with a gland the size of an English walnut in the neck. He had marked exophthalmos. Microscopic examination showed the tumor to be a spindle-celled sarcoma. His case was clearly inoperable. Under treatment by the toxins without other treatment in four months he was perfectly well and is living today, four and a half years since treatment.

The next case was a spindle-celled chondrosarcoma of the upper jaw, which was referred to me in 1913, by Joseph Bissell, who tried radium and failed. This patient underwent three operations previous to the use of the toxin, and has entirely recovered under toxin treatment and has been well during the last three years.

The next case Dr. John F. Erdmann referred to me in the summer of 1915, for toxin treatment. He had removed the superior

maxilla. The patient had had three operations after the removal of the maxilla extending back to the frontal region, and recovered under the use of the toxins alone. He has been well for three years, and I saw him two or three weeks ago.

The next case, a report of which was published in the *Annals of Surgery* in 1916, was seen by the late Dr. John B. Murphy. The patient had extensive disease, apparently primary in the nasopharynx, involving both the superior maxillæ, with extensive invasion of the glands of the neck. He received large doses of the toxins with five *x*-ray treatments at the same time, so that it is impossible to say exactly which agent produced the effect. At any rate, he had evidences of disappearance of the tumor in six weeks. It recurred, and under renewed treatment the tumor disappeared. It again recurred four months later and in spite of further treatment by toxins and *x*-rays proved fatal in four months. Microscopic examination by Dr. Ewing showed it to be carcinoma.

As to the results obtained by other practitioners from the use of the toxins, I will say that several men have reported cases successfully treated and patients well beyond three years. The case of Dr. Weinberg, which he published in the *Medical Record* many years ago had the advantage of microscopic examination being confirmed by Dr. Welch and Dr. Ewing. This patient had had two or three operations and was entirely incapacitated when toxins were begun. He had lost considerable weight. He recovered after eleven injections of the toxin and was well for six years and then died of an acute nephritis, following an alcoholic debauch. Dr. Whitley, of St. Louis, had an inoperable case of osteogenetic sarcoma which involved the whole superior maxilla, the diagnosis having been confirmed by microscopic examination. Dr. Lilienthal published a case of spindle-cell sarcoma of the upper jaw in 1917 that was treated with the toxins, and the patient remained well for five years.

TREATMENT OF WAR WOUNDS IN THE HOSPITALS OF THE AMERICAN EXPEDITIONARY FORCES

By Col. Charles H. Peck, M.C.
U. S. Army, New York City

In order to understand the reasons underlying the adoption of certain principles in the treatment of battle casualties in the medical service of the American Expeditionary Forces, it is necessary to briefly consider the previous experiences of the services of our Allies, French, British and Belgian in the earlier years of the war.

The fact that during the first year practically all war wounds suppurated is too well known to need repetition. The virulence and persistence of the infections, the high percentage of gas gangrene, and the imperfect control of sepsis by simple incision and drainage, led to energetic search for better means of treatment. The most epoch-making discovery resulting from this effort was the Carrel-Dakin method of chemical sterilization of contaminated and infected wounds. It is beyond the scope of this paper to dwell upon the details of this method or the opposition which its brilliant author encountered before its value was conceded. Suffice to say that it revolutionized the treatment of war wounds, and the conscientious surgeon could no longer look upon uncontrolled sepsis and prolonged suppuration as an inevitable sequence, nor wash his hands of responsibility for the outcome. It meant in effect, that it was up to the surgeon to use the

method or to find other means of controlling sepsis equally well.

The result was that other means were found, which under certain conditions would prevent infection and secure prompt healing and quick convalescence; methods which made the routine employment of the Carrel-Dakin treatment with its elaborate time-consuming technic unnecessary; that resulted in healing by primary union, instead of delayed healing after progressive sterilization and secondary suture. Mechanical sterilization of the wound, consisted in complete excision of the tract of the missile with all contused and devitalized tissue, removal of foreign bodies, fragments of clothing and debris of any kind. This procedure has become widely known as "Debridement," the term adapted from the French, for which there is no satisfactory equivalent in English. It depends for success on early operation and the anatomical possibility of removing all contaminated and devitalized tissue, and is therefore not applicable to all wounds. It has been found that there is a period of contamination as distinguished from infection, the duration of which is approximately from eight to sixteen hours; that if complete debridement is effected during this period, infection may be entirely eliminated and the wound healed by first intention.

If operation is not performed before the period when infection has penetrated deeply into the tissues, primary closure is unsafe and will fail in a large percentage of the cases. If debridement is incomplete, if even a small amount of infected tissue is left in the wound, infection will ensue with failure of union or serious sepsis. It is self-evident therefore that successful surgery on war wounds depends on several factors:

1. An organization of well equipped operating hospitals, near enough to the fighting line to permit of operation on the majority of the cases before the period of infection has set in.

2. An adequate number of highly trained surgeons, with proper assistants to care for all cases without delay. War-

wound surgery is no work for the novice or the half trained surgeon; it demands a high degree of surgical skill and judgment, of anatomical knowledge, and training in this particular type of work.

3. Conditions of warfare, of roads and transport, which will permit of prompt evacuation of wounded from the battlefield to the operating hospital.

Early in the second year of the war the French Service de Sante, began developing well equipped operating hospitals, averaging from ten to twenty kilometers from the line, all the way from the Somme to the Swiss frontier. Their average capacity was from two thousand to three thousand patients, and they were well organized for the prompt care of all types of cases, and for rapid evacuation by rail in time of stress, of all cases fit to transport. They were manned by their most skilful surgeons, who during the second and third years of the war, while the line was a comparatively fixed one, developed under favorable conditions the method of debridement and primary suture to a high degree of perfection. They found that 70 to 80 per cent. of wounds of soft parts, 50 per cent. of fractures and nearly all joint cases could be closed by primary suture with less than 10 per cent. of failures. They insisted, however, that primary suture should not be done unless the patient could be kept under the eye of the operating surgeon for at least ten days or until danger of sepsis was past. In times of battle or great stress when it was necessary to evacuate rapidly to hospitals of the interior, debridement was carried out with the same care but the wound was left wide open, packed lightly with gauze, and closed by suture if clean, from three to five days later at the hospital in the interior. This method, called "delayed primary suture," resulted in prompt healing in the majority of cases, in which the debridement had been satisfactorily performed.

I had the privilege of visiting many of these hospitals during the autumn and early winter of 1917, and of working

for several weeks in one during an offensive, observing the methods of many of their most eminent surgeons, both in quiet times and times of stress. I can vouch for the truth of their claims, as I saw hundreds of cases heal cleanly and promptly under this treatment, the principles of which were applied to wounds of all types in all parts of the body.

Complete debridement is impossible for anatomical reasons in from 20 to 30 per cent. of cases, even when operation is performed early and under favorable conditions, *e. g.*, in certain deep wounds of the trunk; especially the buttocks and pelvic region; in large wounds with extensive laceration and contusion. Such wounds must be treated open, sterilized by the Carrel-Dakin or some other method, and when bacteriologic tests permit, closed by secondary suture or if this is impossible, allowed to heal by granulation.

In the British Service development was along similar lines, with rather more attention to wound-sterilization by various chemicals, b. i. p., flavin, brilliant green, etc., and less tendency to employ primary and delayed primary suture as a routine.

In the Belgian Service, the brilliant work of Prof. Depage in his hospital at La Panne is well known, and the treatment of joint-wounds by Willems is the beginning of a new era in the management of this most important group of cases.

Many of our ablest surgeons had been given opportunities in all three services to work as heads of surgical teams; to study surgical methods, so that before American battle casualties began to come in, plans were formulated to utilize in our own hospitals, the best methods developed by all services as a result of three years' experience in active warfare, with casualties in numbers hitherto unknown and undreamed of in history. Before April 1, 1918, a line of splendidly equipped base hospitals had been established, extending from the department of the Vosges in northeastern France to the coast at Bordeaux and St. Nazaire, and huge hospital centers with thousands of beds, were being rapidly constructed.

A school for training medical officers was organized in the zone of the advance. Our first evacuation hospitals Nos. 1 and 2 were established at Toul and Baccarat early in the spring of 1918, and were made centers of teaching for surgeons of the A. E. F., selected from the base hospitals, who were to be made heads of operating teams. These hospitals functionated until midsummer under relatively quiet conditions, twelve and eight miles back of a fighting line which changed very little. Under these conditions, with the possibility of keeping important cases for a week or more, the methods of debridement with primary or delayed primary suture was thoroughly tried out, its practicability demonstrated, and the claims made for it verified. At No. 1 up to July 1, primary and delayed primary suture of wounds of the soft parts had succeeded in over 90 per cent. of the cases on which it was attempted, which included about 60 per cent. of the total.

Over 50 per cent. of fractures were treated the same way with equal success, but it is only fair to state that this series included very few thigh fractures, in which early closure is safe in less than 25 per cent. of the cases. Willems' method of immediate active motion in wounds of joints, after debridement and primary closure, was tried with encouraging results, one series of fifteen knee-joint wounds yielding thirteen primary unions and one delayed union after infection, all with normal knee-joint motion. The remaining case of the series died of a complicating wound of the thorax. The Carrel-Dakin treatment was used in wounds not suitable for early closure and those in which early closure had failed.

During this period ideal conditions prevailed:

1. Well equipped hospitals of sufficient capacity to care for all wounded from eight to twelve miles back of a relatively fixed fighting line.

2. An adequate number of skilled surgeons and surgical teams.

3. Evacuation of wounded from the front in less than

twelve hours, as a rule, and no period of battle with overwhelming numbers of casualties.

Early in June the scene shifted and the type of warfare changed. With the first Château-Thierry fight, hundreds of wounded reached their first hospital in Paris, forty miles from the battle line, thirty-six hours to three or four days after falling. All wounds were infected and no early closure was possible; gas bacillus infection was frequent. Wide drainage and some form of chemical sterilization of the wound was the rule. All the splendid line of French evacuation hospitals had been swept away in the German drive, and open warfare had succeeded the fixed line of trench fighting. There had been no opportunity to establish American front-line hospitals in this sector. Four evacuation hospitals, one mobile hospital and a Red Cross hospital were immediately established near the Château-Thierry sector and field hospitals were reinforced by surgical teams to act as operating hospitals. Open warfare with a rapidly moving line is inevitably accompanied by much delay in evacuating the wounded, and ideal conditions for early operation are difficult or impossible to obtain.

Of conditions which prevailed in the American Army after July 18 in the fighting north of Château-Thierry, in the Argonne forest and along the Meuse, I can only speak from hearsay, but I know that evacuation and mobile hospitals had to be moved frequently to follow the line, and owing to the damaged roads, deep mud and great congestion of transport, especially in the Argonne, that evacuation of wounded from the field was attended by great difficulties and was often delayed. Provision was made early in the period of organization for grouping and giving special skilled attention and hospital space to various types of injury: injuries of bones and joints, of thorax and abdomen, of the head, the eye, face and jaw. Special groups of consultants directed the clinical treatment and operators skilled in special lines of work were assigned for the various groups.

It was soon evident, however, that in the hospitals at the front all surgery was general surgery, that case-grouping could not be done there to any extent, but that each operating surgeon must meet injuries of all types, and that specialization must be reserved for the base hospitals. Centers were designed for the treatment of injuries of the head; the face and jaw; the eye; of bones and joints; for amputations; for orthopedic cases.

A splendidly organized central laboratory furnished personnel and equipment, so that careful bacteriological examination of wounds was a part of the routine even in evacuation and mobile hospitals.

Following the plan of a special committee appointed to study the subject, it also organized a method of blood-transfusion, with simplified apparatus and means for rapidly testing the blood of donors, and standardized the methods of treating shock.

The efficiency of the organization of the medical department of the A. E. F. is attested by the manner in which it cared for casualties, totaling more than a quarter of a million during the active fighting between June and November, 1918, and the excellent condition and morale of the overseas wounded now coming in large numbers through our ports of debarkation.

SOME NOTES FROM THE EXAMINATION OF FIVE THOUSAND SELECTIVE SERVICE REGISTRANTS

By Alexius McGlannan, M.D.
Baltimore, Md.

Medical Advisory Board No. 2 met at the Mercy Hospital, Baltimore. The original appointment named eleven members. This number was later increased to thirty-two, so that when the time arrived for making the examinations, we had three committees, each of which was sufficient for making the complete examination of the registrant. The personnel of the board was changed from time to time because of the resignation of members who entered the Medical Corps of the Army. The following is a list of the members:

Internists: W. F. Lockwood, Eugene Van Nees, Julius Friedenwald, T. F. Leitz.

Lung Examiners: J. Hall Pleasants, R. W. B. Mayo, W. Dabney, Frank R. Smith, John King, Jr.

Neurologists: W. R. Dunton, Jr., G. R. Sargent, G. B. Wolf, E. N. Brush.

Surgeons: Alexius McGlannan, W. W. Requardt, E. H. Hutchins.

Ophthalmologists and Otologists: Herbert Harlan, J. W. Downey, Jr., Harry Friedenwald, J. W. Funck.

Rhinologists and Laryngologists: F. D. Sanger, G. W. Mitchell, H. E. Peterman.

Dentists: Norval McDonald, N. F. Le Cron, W. W. Dunbracco, Carl E. Smith.

Clinical Laboratory: W. R. Stokes, F. W. Hacktel, C. W. W. Judd.

Urologists: B. F. Hanna, A. E. Goldstein, W. J. Todd.

Orthopedist: Albertus Cotton.

X-ray: H. L. Rogers.

Proctologist: C. F. Blake.

We soon found that careful heart and lung examinations required the services of more examiners in this department than in any other. Moreover, it became necessary to regulate the number of registrants examined at each session of the Board by the endurance of these examiners. This Board received its cases from eight local boards of Baltimore City and four of the county. In referring a registrant the Local Board Officers sent his Form 1010 to us by mail. Our clerk acknowledged its receipt by return mail. Forms 1010 were filed in order of receipt and we called the registrants for examination in this order.

Fig. 1

Your are hereby ordered to report at

Mercy Hospital

Calvert and Saratoga Sts.

Baltimore, Md.

on.....at.....M.

for examination by Medical Advisory Board No. 2.

Failure to report as ordered will make you delinquent.

The call was made by mail, using a special form card (Fig. 1). As a rule, forty men were called for each session, this number being about the limit as measured by the endurance of the heart and lung examiners. The board's record card (Fig. 2) was prepared by entering the name and number of the registrant. With Forms 1010 the cards for each call were placed in a box file.

X in this margin, at proper place.

Fig. 2

MEDICAL ADVISORY BOARD NO. 2, MERCY HOSPITAL, BALTIMORE, MD.

County
City Board No.

Date, Occupation,

Serial Number Order Number

Surname Given Name Age Race

Person under Examination stripped.

Weight lbs. height inches

Girth of Chest at Nipples: Expiration Inches; Inspiration Inches

General Examination—head, chest, abdomen, extremities.

Hernia ; Hemorrhoids.

R—L—Variety—Size

Comment.

Examiner's Initials

Heart

Abdomen

Blood-pressure

Systolic Diastolic

Comment

Examiner's Initials

Tuberculosis

Lungs

Examiner's Initials

If consultation is desired indicate by

Neurological

Examiner's Initials

Genito-urinary Organs. If urine examination is needed send to Clin. Lab.

Comment

Examiner's Initials

Flat Foot.

Deformities in general.

Vertebral Column.

Comment.

Examiner's Initials

Teeth		Right	Left	
Missing	Upper,	8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8	Strike out those missing
Defective and	Lower,	8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8	Encircle those defective
Replaced.				× Mark those replaced

Comment Remediable: Yes No

Examiner's Initials

Nose and Throat.

Comment

Examiner's Initials

Eyes,	Vision	Right Eye	;	Left Eye
Ears,	Hearing	Right Ear	;	Left Ear
Comment	Otoscopic			

Examiner's Initials

Clinical Laboratory Tests—X-ray—Proctoscopic—Wassermann—Urine

Examiner's Initials

The examinations were made at night in the Dispensary rooms situated in the medical school adjoining the hospital. These rooms are on the ground and main floors of the building. The registrants entered by the main door on the ground floor and were met at the admission desk by the chief clerk, who had the night's record cards in front of him. The registrants were sent first to the dentist and the nose and throat examiner, whose rooms were on this ground floor. Next each registrant was given a basket in which to carry his clothes and sent into a small room to undress. At first we supplied gowns and dusters, but the men seemed to prefer wearing their own overcoat or coat and trousers and shoes without underclothes or stockings, so the custom was abandoned. The baskets proved useful and did away with any necessity for checking clothes or valuables. While a registrant undressed his record card was sent by the messenger to one of the examining rooms on the main floor.

After undressing, the registrants were sent up stairs and here they entered on one of two circuits—the first from neurologist to eye and ear, to cardiovascular, to central table; the other from surgeon, to pulmonary, to central table. At the central table one member of the board, usually a clinical laboratory examiner, presided each night, keeping order, checking up the records, signing Form 1010 and referring such cases as needed it to the *X*-ray, the orthopedic and the genito-urinary examiner. Whenever they were needed, special arrangements were made for complete gastro-enterological, urological and proctological examinations. Whenever a defect was discovered which unfitted the man for any military service, his examination was stopped and his card sent to the central table. The registrant was then called on by the presiding officer to sign his name on the card for identification, given a tag to be presented to the door-keeper and allowed to go home. Similarly, a registrant after completing the circuits signed his card and was dismissed. A registrant having a curable defect was given a

pink card (Fig. 3). Registrants requiring deferred or special examination were given call cards, on which were filled in the time and place for the examination. When necessary the registrant was admitted to the hospital for completion of his examination.

FIG. 3

MEDICAL ADVISORY BOARD NO. 2

BALTIMORE, MD.

Your have been placed in the Deferred Remediable Group on account of.....

When the authorities are ready, you will be ordered to camp and the proper treatment given after your arrival. YOU CAN HELP WIN THE WAR by securing treatment at once. If you will present this card at the office of the Mercy Hospital, arrangements will be made for your treatment without any cost to you.

In dividing the work the surgeons were assigned the following examinations: Height and weight, chest measurement, condition of skull, face and neck; condition of the extremities, of the musculature, skin bones and joints; general characteristics, examination for hernia, varicocele and hemorrhoids. All conditions of the feet, the spine and the joints which were not clearly disabling were referred to the orthopedist.

The following are a few interesting points noted in a summary of our records made by the surgeons: We examined 5060 men, 3429 of whom were white, 1422 negroes, 4 yellow and in 205 the race was not known. Nearly 33 per cent. were between 65 and 68 inches in height, 1 per cent. measured over 72 inches, 8½ per cent. under 60 and 10 per cent. between 60 and 63 inches. There was no racial peculiarity noted in relation to stature.

INGUINAL HERNIA. Inguinal hernia was the most noticeable curable defect. There were 397 cases of this lesion, 294 in white, 78 in colored and 25 cases in which the race was not

noted; 173 were right sided, 160 left, 48 double and in 16 the side was not given in the record; 215 of these were placed in the class of curable defects after their complete examination; 118 were passed for limited service and 64 were rejected. Only 5 cases of inguinal hernia were considered incurable, and of these 2 were large recurrent ones.

Femoral Hernia. There were 7 cases, 6 in white and 1 in a colored man; 3 were passed for limited service, 3 were classed as curable defects and 1 man was rejected on account of a lung lesion.

Umbilical Hernia. There were 25 such cases; 5 occurred in white men, 19 in colored and in 1 no race was recorded; 3 of these hernias were so small that the men were passed for general service, 8 were classified as remediable defects, 10 were sent for limited service and 4 men were rejected for other causes.

Ventral Hernia. There were 7 cases, all postoperative, 4 through the right rectus. In the other 3 cases the location of the opening is not noted; 5 were considered large; 6 occurred in white men; 3 were considered curable and in the other 4 cases the men were passed for limited service.

Varicocele. 255 varicoceles were recorded; 224 were left sided and 6 right sided; in the remaining 25 the side was not given, 219 were in white men, 22 in mulattoes, 2 in black men and in 12 the race is not noted; 69 were recorded as large, and in 7 cases the surgeons considered the lesion of sufficient size to require operation. The great rarity of varicocele in the black race as compared with its frequency in the white is worthy of notice. This rarity is even greater than indicated, because one of the black men mentioned above had a general venous distention of the left leg, thigh and groin as well as the varicocele. He dated his swollen veins from an unrecognizable illness which occurred about ten years ago.

Undescended Testicle. There were 26 cases of this lesion; 11 on the right side, 11 on the left, 2 double and 2 in which the side was not reported; 15 cases occurred in white

men, 8 in colored and 3 the race is not given. In 12 cases the testicle was in the inguinal canal and these men were rejected. In 9 the testicle remained in the abdomen. In the 5 other cases the examiners passed the men as having curable defects on account of the associated hernias.

Congenital Defects. Certain interesting congenital defects were noted. In 2 cases there was congenital absence of the pectoralis major muscle. In 1 case, in a colored man, the right side was affected and the other, a white man, had no left pectoralis major. In 1 white man there was congenital absence of the clavicular bundles of the pectoralis major and the lower part of the trapezius on both sides. One yellow man had an absence of the right forearm and hand. The right upper extremity ended with a smooth knob-like lower end of the humerus. One white man had a left cervical rib with some atrophy of the entire left arm. One colored man had webbed toes on both feet and webbing of the corresponding two fingers on the left hand. One white man had webbing of all fingers on the right hand and of two fingers on the left. Another white man had webbing of the middle and ring fingers of both hands. One white man had a flail index finger, with absence of the middle finger and a cleft reaching the carpus in the middle of the right hand. Another had supernumerary thumbs on both hands. The additional digits were deformed and ankylosed at right angles to the normal metacarpal bones. There were 2 cases of Dupuytren's contraction: One involving both hands in a white man, two involving the right hand, one of which was in a colored man.

Multiple Fibromyxoma of the Skin. Two cases were noted, 1 in a white and the other in a colored man. No other defect was noted in either case.

Pilonidal Sinus. Two cases were noted, both in white men.

Dystrophia Adiposis Genitalis. 19 cases were noted of this disturbance of the endocrine function; 17 were in white

men, and 2 in negroes. One of these men was accepted for general duty, 14 for limited service and 4 were rejected.

Eunuchoidismus. One case of this endocrine dystrophy was noted. The man was a negro, aged twenty-three years. He was 72 inches in height and weighed 138 pounds. His arms and legs were long, while his trunk was relatively small, the chest measuring 33 inches. The genitals were poorly developed, the testicles being quite small. His span was 77 inches, 5 inches greater than his height.

Infantile Palsy. 15 cases of the paralysis of anterior poliomyelitis were noted, 11 in white men and 3 in negroes. In 9 cases the lower extremity was involved, in 4 the upper and in 2 both lower and upper extremities were paralyzed; 8 of these men were rejected and 7 were accepted for limited service.

Birth and Obstetric Palsy. Three cases of birth palsy were observed. In one there was a right hemiplegia, in a second the right arm was involved and in the third there was a left hemiplegia. In all cases there was atrophy and spastic paralysis; the second and third cases were in white men while in the first case the race is not noted. In 1 case there was flaccid paralysis of the arm and forearm, associated with an ununited fracture of the clavicle, which was said to be the result of an obstetric injury.

MUSTARD GAS BURNS

By W. P. Carr, M.D.
Washington, D. C.

Last spring and summer I observed and treated four patients burned with mustard gas. There are at least seven varieties of gas included under this general term and I am unable to say which variety produced the lesion in my cases. The phenomena presented by these burns were so unusual and interesting to me that I hope a brief report of them will be of interest to you. Most of the unusual features were present in each case and were as follows:

1. A long interval intervened between exposure and the appearance of symptoms. This interval varied from sixteen to thirty-six hours and reminded me in this respect of poison ivy. No disagreeable sensation was felt at the time of exposure, nor until after the lapse of many hours, when pricking and stinging sensations commenced in the skin. This was followed a few hours later by the appearance of vesicles which rapidly coalesced into large blebs. One patient did not even know for thirty-six hours that he had been in contact with the gas.

2. There is an acute stage during which the poison absorbed into the tissues continues its destructive action. This acute stage may last a few days or for the astonishing period of two or three months, and may be interrupted by quiescent intervals when the wound seems to be healing. In this respect also the gas acts in a manner similar to the toxin of poison

ivy and some similar substances, which cause recurrences after apparent healing. This active destruction may go on in part of a burn while other parts of it are rapidly healing.

In one of my cases, although part of the wound healed with remarkable rapidity, even when the whole thickness of the skin was destroyed, successive layers of slough continued to form and shed off in the deeper portion for about two and a half months; until in places the destructive action had eaten nearly an inch into the underlying muscles over an area of about six by ten inches. Numerous cultures were made during this period, but no organisms were found except on two occasions, the hay bacillus. I am inclined to believe that the poison killed bacteria as well as the patient's tissues.

The wound would look healthy for a week and then become covered with dead tissue and bathed in pus, which always proved sterile or practically so, and when this slough loosened and came off a clean, healthy looking surface was left again. This recurred repeatedly, sometimes over part of the raw surface, sometimes over the whole of it, until I almost despaired of it ever healing. Cauterizing the surface with silver nitrate aggravated the condition, and wet dressings of Dakin's fluid and other mild antiseptics did no good except to help dissolve the sloughs. Individual susceptibility varies greatly, as it does to poison ivy and its congeners. Three of my patients were experimental chemists working on war gas in the same governmental laboratory. They told me that sixty workers in this laboratory had submitted to small experimental burns in testing gases or protective skin coverings. There was, they said, great variation in susceptibility and a few were practically immune.

3. The duration of the acute stage and consequent severity of a burn depends largely therefore, upon individual peculiarity as well as upon the length of exposure and degree of concentration of the gas. It is difficult or impossible to tell how severe a given burn will be until the acute stage is over, and difficult to say when it is really over, until a week or ten

days has elapsed after the wound has appeared to be healing, for a relapse may occur later.

4. The intensity of inflammation caused by the gas is evidenced by the great infiltration of the skin with yellow lymph, stained with broken-down hemoglobin and coagulated into a solid mass resembling hard fat. These blebs invariably destroy the whole thickness of the skin and may go much deeper and tissue destruction may continue after their separation. Fluid exudate from them, or from under them, if allowed to remain in contact with the sound skin, may cause a serious lesion. In appearance and to the touch the blebs resemble lipomata. Some of the beautiful wax models in the Army Medical Museum, made by Captain James F. Wallace, illustrate this in a striking manner.

5. During the acute stage there is burning pain, severe at times, even when the wound is covered with a bland dressing and at rest. But when exposed the lightest touch with a film of cotton, a drop of water or even a breath of air will cause severe pain. When the acute stage is past the raw surface is not sensitive.

The extreme penetrability of the gas was well illustrated by Case II (appended). This young man was tightening a connection in a pipe leading from a tank of gas. He did not know that any of it had gotten on his skin, but thirty-six hours later he began to burn and tingle, not only on his left hand, which had held the pipe, but all over his chest, abdomen and legs and on the upper surface of his feet, although he had on high shoes and stockings when exposed. Fortunately, all the burns were only of the first degree and healed in ten days except those on his left hand. The burn on his hand, however, continued active for nearly three weeks and destroyed the whole skin on the dorsum of three fingers and between the fingers. Healing may progress rapidly in the superficial part of the burn at the same time that active destruction is going on in a deeper part.

Treatment. From my limited experience I should say that all blebs should be cut away with scissors and the sound skin and superficial part of the burn protected with a coat of ambrin or paraffin after a thorough cleansing with sterile water and drying. I found in my cases that a dressing of ambrin gave marked relief and that healing was more rapid under it than under any other dressing used. Wet $\frac{1}{4}$ per cent. carbolic-acid dressing and the Dakin-Carrel dressing were used at times and the former did apparently relieve pain while the latter had a marked effect in dissolving stubborn sloughs and lessening discharge. Brief histories of my four cases are appended:

Case I.—R. M., civilian experimental chemist, aged twenty-four years. March 9, 1918, while doing experimental work for the Government at the Catholic University, D. C., accidentally broke a container and scattered some of the contents of liquefied gas over himself. He immediately washed the exposed surfaces, but did not remove his clothing until two hours later at bedtime. He did not think enough gas had got on his clothing to do any harm. Nothing was noticed until sixteen hours later, when itching, burning and pricking sensations were felt over the chest, abdomen and right leg. The next day vesicles appeared on the right thigh and wrist. The vesicles rapidly coalesced and formed large blebs filled with solid coagulated yellow serum. He was sent to the Emergency Hospital and I saw him there at the request of Dr. George Ruffin and took charge of the case the eleventh day after the accident. He had been treated from the onset of symptoms to this time with compresses wet in sodium bicarbonate solution and 25 per cent. magnesium sulphate solution.

When I saw him he had a deep burn on the flexor surface of the right wrist, about one by two inches, large pigmented areas on the chest and abdomen, where very superficial burns had been and a very large burn on the right thigh extending from the middle of the knee-cap to two inches above Pou-

part's ligament, over the scrotum and head of the penis and more than half-way round the thigh on the anterior aspect. The edges of the wound were superficial, but gradually deepened toward the center until the whole thickness of the skin was destroyed at an average distance of an inch and a half from the edge. Sloughs had come off this part of the burn, leaving a red, granulating, clean surface, but an area in the center, about six by ten inches, was covered by large blebs that looked and felt like fatty tumors after removal. These solidified blebs were still tightly attached and went through the skin and into the underlying muscle. They were trimmed off with scissors and the whole burn dressed with ambrin. Ambrin dressings were applied every day or every other day for a month, and with occasional interruptions of a week when the Dakin-Carrel method was tried. These ambrin dressings were continued for five months.

The superficial portion healed rapidly, and even portions where apparently the whole thickness of the skin was destroyed healed in a month without apparent scar, but a large area in the center, originally covered by the blebs, continued to form and shed off sloughs for two and a half months at intervals of about a week. This part of the wound consequently grew deeper and very irregular in depth. Parts of it ate into the muscles for nearly an inch. The discharge was free during the acute stage, which lasted about three months and consisted mainly of coagulated lymph and serum. It was examined at intervals of a week, but no organisms were found except on two occasions, when the discharge became green and hay bacilli were found.

The patient on these occasions noticed the odor of hay, or dried apples, as he called it. On several occasions epithelium which had accumulated around the edges was scraped off and scattered over the surface, where it began to form islands, but these islands came off with sloughs. Finally, when I was almost in despair, the sloughing ceased, granulation became rapid and numerous islands of epithelium became

apparent and grew in a very satisfactory manner. These islands fused and cut up the large raw surface into several small areas. Healing was rapid, and by June 10 was nearly complete. I left the city at that time for three weeks, expecting to find the cure complete on my return, but when I got back I found the raw surface larger than when I left, and infected with Bacillus pyocyaneus.

A week's treatment with $\frac{1}{4}$ per cent. carbolic acid solution got it into healthy condition again. Ambrin dressings were resumed, and by August 10, healing was complete. There was almost no perceptible scar, but much brown pigmentation. I attribute the lack of scar to the ambrin treatment. I have used it or paraffin on many bad burns, and have been highly gratified to find little or no scar perceptible even when the whole skin has been destroyed. I have seen no difference in the result whether ambrin or parawax was used.

Case II.—L. G. W., also an experimental chemist, working for the Government. He was burned in Cincinnati about May 9, 1918, and treated in a hospital there until May 20, when he came to Washington, and I saw him first May 21. He said he was tightening a connection on a pipe leading from a tank of gas and did not know he got any of it on him until thirty-six hours later, when he began to tingle and have a pricking sensation of the skin. In a few hours more vesicles appeared on his left hand and light burns of the first degree, with a great amount of dark brown pigmentation, appeared on his chest, abdomen, legs and even on the dorsum of each foot, although he was wearing high shoes. He could not say whether the gas penetrated the leather or filtered through the shoe tops. When I saw him ten days after the first symptoms he had what I took to be a burn of the first degree over his whole left hand except the palmar surface. The yellow blebs appeared, however, a few days later and the whole skin was destroyed in the sulci between his fingers and over a large part of the dorsum of his hand and fingers. I treated him for three weeks with ambrin. The sloughs

came away and healing was well under way at that time, when he left the city for the West.

Case III.—H. S., Lieutenant in the Army and an experimental chemist. He had a burn about the size of a half-dollar on the forearm, made as a control in testing a protective dressing for the skin. I saw it thirty-six hours after exposure. Vesicles had appeared. The next day two yellow blebs about half an inch in diameter developed and left deep but small ulcers that took three weeks to heal.

Case IV.—J. M., civilian chemist, case almost identical with Case III.

DISCUSSION ON THE PAPERS OF DRS. McGLANNAN AND CARR

Dr. Henry O. Marcy, Boston, Mass.—In the first place, I desire to express my appreciation of the excellent paper read by Dr. McGlannan, to which you have listened with interest. In the second place, I want to refer to a case which has a bearing on the subject of hernia. My old friend, the late Dr. William H. Wathen, of Louisville, desired me to give a demonstration in the hospital before one of the large surgical societies meeting in Louisville. He had his patient ready for operation; the hour was fixed and I was to operate for hernia. The patient, however, changed his mind. I was asked to see him; he was the janitor of the medical college. He was a colored man, in good general physical condition, but with a large reducible hernia, especially desirable for a demonstration. Dr. Wathen was very impatient with the man, and said to him, "If you don't submit to operation. I will discharge you." The colored man said, "I leaves it to de doctor whether to be operated on. Dis here big bust is worth thirteen dollars a month to me." I told him he had better keep his bust, and so I lost the demonstration.

I reported to Surgeon-General Sternberg and suggested that an order should be issued by the Medical Department of the United States Government to the effect that all pensioners should be reëxamined for hernia and those fitted for operation

be given an opportunity to be operated free of cost provided they would accept it. There was nothing said as to what would follow. If those men were cured they were to be discharged from the pension list, and this was the inauguration of a law that is still in existence. I would like to refer to an anecdote in connection with Surgeon-General Gorgas. About the time of the beginning of our enlistments he was asked as to what attitude he would advise with reference to hernia, and he replied, "I have but one thing to say about it and that is, send these men to me for cure."

Dr. George A. Hendon, Louisville, Ky.—I thought it might be interesting to file with Dr. McGlannan's report the statistics of the Medical Advisory Board in Louisville, and these statistics make good comparisons.

An analysis of 5000 cases examined by the Advisory Board shows the following results: 1795 cases were found qualified for general military service and placed in Class A. The remainder were found disqualified in varying degrees because of defects noted below, and were placed in groups B, C, and D. Because of constantly changing regulations and instructions it is not possible to hold to the exact groups in making this analysis, as defectives who would at one time be placed in group B would a few days later fall into group C, and those going into Group C would in the same manner be placed in some other classification at a later date. For this reason I am simply giving the percentage of and number of men found defective in certain ways:

Teeth	.110	550
Eyes	.139	695
Ears	.042	210
Fractured skull	.003	15
Chronic sinusitis	.001	5
Heart	.085	415
Toxic thyroid	.004	20
Goitre	.001	5
Lungs	.043	215
Asthma	.003	15
Upper extremities	.031	155
Lower extremities	.023	115
Ulcerated varicose veins	.005	25
Feet	.017	85
Hernia	.045	225

Kidneys	.001	5
Hunchback	.001	5
Curvature of spine	.003	15
Fistula	.003	15
Weight	.064	320
Low mentality	.008	40
Tabes	.002	10
Height	.001	5
Drug habit	..01	5
Epileptic	.003	15
Stammerer	.003	15
Chronic osteomyelitis	.001	5

Dr. Joseph C. Bloodgood, Baltimore, Md.—I hope the other members of the advisory boards throughout the country will follow the example set here. This information will be interesting in their own localities, as it is news of value if one can get it before the people and the medical profession. If we desire in this country to establish compulsory physical examination of children and introduce in our school system a better physical training, it is absolutely important for everyone to know the facts, and we have the facts. We never had them before.

The majority of men who were not fit physically or mentally for military service were deficient because of preventable conditions. There were 10 per cent. due to the teeth only, and the majority of these lesions which left them in this condition had their onset before the age of twenty-one, and if one could get these facts before the public so as to have the physical examination of children, protecting them as far as possible, he would accomplish a great deal. I sincerely trust we can get this propaganda going now.

Dr. McGlannan is to be congratulated on the method he has presented. His paper was very short, but it tells the story. There are a great many other things that are most interesting that we have evidence of in this country. Probably many do not know that there were 700,000 men in the draft who could not read or write any language, and that one of the chief causes of rejection at the camps was for a mental condition not defined in the regulations. We described the imbecile and moron, but we did not describe the man who did not have the mentality to be a modern soldier; so we rejected him on the ground of mental deficiency, and a great many of the local medical advisory

boards could not understand why these men could not read or write. They had no education; they were brought up in an environment in which they were given no opportunity to use their minds or to become independent. They were dependents from birth, imposed upon often by their employers and paid less wages than they were really worth. This must be impressed upon the public. Mental deficiency was a most important thing in this country, and it is surprising that 700,000 men should not have the mentality to be trained in a few months in simple things.

Dr. McGlannan (closing).—Dr. Carr's objection to the figures is sound. We know we were dealing with men picked from another set of men and depending upon the mental characteristics of the doctors who picked them. We learned from the *Journal of the American Medical Association* that the Surgeon-General has in the process of making a tabulation showing the relation of imperfect men to the total number of men called in the draft. All that our figures show is, for example, of the 5000 men we saw in Baltimore, 394 had hernias.

EVACUATION OF THE WOUNDED

By Colonel Bailey K. Ashford, M.C.
U. S. Army

Apart from purely surgical considerations something must be done to have a better understanding of what is necessary to separate the humanitarian aspects from the purely military ones in the surgery of war. In the first place all of the sciences and all of the arts are being applied to war, and they are being applied with the object of not merely fulfilling a humanitarian mission, but with the object of beating the enemy. All of the sciences being dedicated to war, it is proper that the medical sciences should be so applied. Formerly, in military matters, medical science was invoked and developed for the purpose of relieving the individual who was sick or wounded; he was taken to the doctors and the doctors did what they could for him. It was a matter of the attention paid to the individual, was immensely humanitarian, and both line and medical officers recognized it as such, but now there is something more. In those days, while humanitarianism was always practised, it was always recognized that it did not form a part of the military program *per se,* except in the sense that it kept up the morale of the troops.

We have heard what Colonel Peck has had to say about the work done by the medical department for the purpose of salvaging men to get them back again to the lines. It is through the good work of the medical corps that our sources of reinforcement of troops mainly come in the end. The sol-

diers that were badly wounded or very sick used to be sent to the rear to suppurate or die, and in either case they were generally permanently out of the fight. Now, many of these men are salvaged and sent back to the fighting line. The medical corps thus becomes active in war, in offensive warfare, and is consequently now taken into account in all preparations for military operations. The only people that can salvage soldiers who are sick and wounded are medical officers; they cannot be salvaged by anyone else.

Another thing: our organization of the medical corps has been built along military lines. We know what troops we are going to have and we take with us what is necessary to keep up with these troops, it being a military necessity to practise our art in time of war by the application of medical science to the object of war. But our organization depends somewhat on scientific facts because the sciences have changed war. Today we have a better and more complete surgical equipment because this of itself has become a military necessity.

There is another thing that has changed our point of view as doctors in the Army, and it is this: These things above mentioned being so, when we go to war we must learn how to administer as well as to operate. A great many men with good intentions have the idea of doing nothing else but surgery. They say: "That is what I am fitted for, that is what I came into the army for, and I do not feel that I ought to be called to do anything else." No one individual will ever be large enough to administer all the details of these specialized forces alone. Every medical man, laboratory man, eye, ear, nose and throat man, surgeon, must be also an administrator. All of us must work along lines which will contribute to the greatest efficiency—efficiency not only in operating, but in taking an active part in getting the men back to the firing lines. A medical man should not sit down and wait for some other man to do this or that, but should go out among the men, study the psychology of the men and pick out a man who is sickening before he is really sick. There

are a great many para-medical and para-surgical things that must be done by the military surgeon. That is why he differs from the civilian physician. Medical men must know how to take care of their units.

Again, the surgery of war has moved up to the front considerably. But there has been a little swinging back in the last year and some of the surgery we thought it was necessary to do at the front has been moved farther back because the hospitals at the front are overcrowded. Good medical care and rapid transportation were never so important as they are today. First-aid dressings are not enough any more. They should still be used because the one microbe we fear is the Streptococcus hemolyticus. We are not afraid so much of other organisms, but we are afraid of the streptococcus; therefore, first-aid dressings should be persisted in. A man wounded by shell fragments must be operated upon and the wound need not be necessarily severe to require it. It is the clothing that gets into the wound that carries the microbes that make the trouble. When we get rid of the clothing and dead tissue and place our man at rest we have won the day; we take the projectile out too. Radiology and bacteriology are great aids in this work. The radiologist goes into the operating room, and when the bacteriologist is also around and is present at the operating table, things are moving. The bacteriologist is a valuable adjunct to the surgeon. He can often tell the particular organism or organisms which are in the wound within eight hours after the patient comes under observation. The surgeon can operate, even sew up the wound under certain conditions, and not interfere with it again if the bacteriologist's report is negative. If the Streptococcus hemolyticus is reported within the next twenty-four hours the wound is reopened.

With reference to first-aid stations: they generally serve from 800 to 1000 men. They are usually placed from 200 to 600 yards in the rear of the active part of the line where the casualties are coming in. They are placed with the support in trench operations and in the woods or some other secluded

place in open warfare. The equipment is small but complete to keep the man alive and in as good condition as possible until you can get him to where he can be cared for. We do not operate at the front any more, as it is not justifiable. We have not time to do it and it is not right to do it. It does not give a man a proper chance.

A battalion surgeon should be a selected man. We should get the very best young men at the front. I am speaking of the best all-around men. There are very few surgeons who can make a rapid and correct diagnosis right on their feet. When a man has a wound with dirt ground into it, with a piece of the projectile sticking out of it or bits of denuded bone in plain view, we remove these things, clean the wound as rapidly as possible and put on a dressing. The American Army has succeeded in teaching all medical department men how to put on a Thomas splint. One might think that when a man is scared to death he cannot put on that splint, but it is mechanical with him; he has been drilled to it "by the numbers," and can do it with his eyes shut. We have tried to introduce the habit of putting on this Thomas splint in No Man's Land, and the men are often transported back to the first-aid station with their splints already on. In that way great shock is prevented because pain is one of the accentuating factors in shock. At the first-aid station one does not expect to have to treat shock because it does not usually develop there. It is generally at the evacuation hospital where we encounter the first cases of shock. The best way to treat shock is to prevent it. If a man is suffering very much, one can relieve pain, and by so doing one can aid in preventing shock.

The next thing is to treat hemorrhage. One cannot transfuse blood at the front, but can use, sometimes, the intravenous injection of gum arabic. One can stop a bleeding vessel by tying it or by the use of the tourniquet. If the patient is in bad condition, transport him with the tourniquet on loose but ready to tighten up at a minute's notice. Another thing sometimes necessary at a battalion aid-post

is to remove a dangling limb that is practically off. This is about all one can do; then send him back.

Litters are carried by four stretcher-bearers. I know of no more dangerous work than that of a stretcher-bearer. It often takes twelve men to get one man back from the front line to an ambulance head in a deep sector, so we have been using Fords as mechanical litter-bearers between the first-aid stations of the battalion and the true ambulance head.

An ambulance station corresponds to what we used to call an ambulance dressing station, where dressing is done only when it cannot be done by the battalion surgeon. The regimental station does not exist any more in trench warfare as an indispensable dressing unit; at least, it does not in military practice. We use a battalion aid-station and from there send men back to the ambulance station. Everybody is working against time. It is a question of operating on the man as soon as possible, so that the ambulance dressing station in practice is a relay post or an evacuating depot. There the men are given hot drinks, looked over and prepared to go back in good condition. There are professional men to determine that. If a man is not in good condition he is loaded on to a heavy ambulance and taken back to the field hospital, where they do the sorting or "triage." It is necessary to send gassed cases and sick cases one way and the wounded the other. Those who do the sorting for us are specially trained. The men are roughly sorted at the ambulance station by the tags; there is not time to take off dressings. The severe cases, known as the non-transportable wounded, are separated from the moderately and slightly wounded at the field hospital triage. Certain badly wounded men are operated on at the field hospital proper by expert surgeons. There they operate on wounds of the chest and the abdomen and treat shock. It is not advisable to operate on the skull there as such cases bear transportation well, as a rule, but bad cases have to receive attention sometimes. Only operations of absolute necessity are done at the field hospital, but in all only about 0.5 per cent. of all wounded are operated upon

there. It is not the place of choice for a surgical operation. The field hospital is no place for everyone to have his operation done when he can be taken to places where there are more conveniences and better facilities. When I say that at Château-Thierry, Evacuation Hospital No. 7, I think it was, had 2000 wounded pass through it on one day, one can imagine the necessity of attending to this great stream of wounded men rapidly. The staff at the field hospital go over the dressings and see if the man needs operation immediately or is *in extremis*. If not he is loaded on to trucks or ambulances and sent back to the evacuation hospital. The needs of the walking wounded are cared for elsewhere. The evacuation hospital is the real center for surgical work. In this surgical center there must be men who can operate on any sort of a case. It is rapid surgical work; a man must not try to do elaborate operations because he would stop the stream of wounded coming in. One must devote his attention to doing what he really ought to do to get the man back in the best possible condition.

Surgeons close joints quite extensively. They take away the dead tissue; they remove foreign bodies as far as possible. I cannot go into surgical technic, but what I have said will give a fair, although rough, idea of the surgical side of the battlefield and the means of evacuation, and this latter phase of surgery is very important.

We have been teaching the young men of the United States to become good doctors and take care of individuals; the time has now come when medical schools should consider the teaching of young men to preserve the national life in the great crisis of war. We have a duty to our country which we must always remember in the days of peace. We have just passed through a jolt, and I hope that if we ever have another war we will be prepared for it and that we will teach our men now that in war there is something we doctors can do for our national life, as represented by our Army, which is different from what we are accustomed to do for the individual.

THE ART AND SCIENCE OF SURGERY: ANESTHESIA AND ASEPSIS, THE TWO CORNER-STONES IN OUR ÆSCULAPIAN TEMPLE

By Henry O. Marcy, A.M., M.D., LL.D.
Boston, Mass.

The surgeons of the present day very naturally consider that in this age of modern science, the early art of surgery may well be relegated to forgetfulness and obscurity. This is a grave error; from the earliest periods of history lessons of much profit are to be learned. The limitations of this paper permit only a brief reference to this most interesting subject.

Very naturally, we begin with Hippocrates, the so-called Father of Medicine (460 to 361 B.C.). The definition which we rightly give of the surgeon—a skilled physician and something more—applies to Hippocrates. We remember that he lived in the Periclean Age, the era of the social and intellectual greatness of the Greeks, and he may be accepted as an exponent of the development of this nation at the zenith of its power. The mighty Persian invasion had been defeated, the tides of battle had ebbed and flowed over this ancient land, much as in our own day.

A touch of the human side of Hippocrates is the following story: Perdicas, King of the neighboring country of Macedonia, had been thought for many months a victim of consumption. At last, taking counsel with wise men, Hippoc-

rates was sent for. This thoughtful physician soon discovered that the young man was hopelessly in love; "nor in this was he mistaken, for Perdicas had become enamored of his father's concubine Phila, who, when the matter was communicated to her by Hippocrates, so accommodated her behavior toward the young king that his health was in a short time completely recovered." (John Moffet, M.D., *Life of Hippocrates*, London, 1788.)

We like to recall that Hippocrates was a contemporary of Socrates and imbued with a like philosophic spirit. He died in Larissa, whither he had gone to the rescue of the lovesick Perdicas more than half a century before. His essays upon surgery, upon fractures, ulcers and tumors, show a wide general knowledge. He discusses the art of trephining, methods of operation for hernia, lithotomy—both by the perineal and the suprapubic routes. He opened and drained the chest for empyema and hydrothorax.

Nothing is finer in the literature of medicine than the Hippocratic oath, which every member of the profession should accept as his code of ethics. My late distinguished friend, Dr. Henry A. Didama, of Syracuse, New York, administered this oath when, as Dean of the Medical College, he presented their diplomas to his graduates.

Necessity is called the mother of invention. From the development of organized society, having established laws regulating the modes of life, the various professions arose. Their main subdivisions formed primary lines of cleavage—the moral, the religious, the legal, and the medical codes. The Mosaic code recorded these divisions. We now understand well the value of the first surgical service administered to every male child—that of circumcision. Repeated evidences of the medical profession among the Hebrews are familiar to Biblical students. The story of the good Samaritan binding up the wounds of the stranger with the dressing of oil and wine—a prototype of our modern aseptic treatment—is traceable to an Egyptian origin. More than a

thousand years before Hippocrates, we find the osteologic proof of Egyptian skill in the trephining of the skull and in the treatment of fractures.

Some years ago, my late friend, Prof. F. W. Putnam, curator of the Peabody Museum, Cambridge, favored me with the opportunity for a careful examination of the entire pre-historic collection. There was one skull in which, following a cranial injury, definite evidence of subsequent reparative growth was present believed to show proof of trephining. I photographed this specimen; when thrown upon the screen, the magnified picture clearly revealed a fracture extending nearly to the base of the skull and an irregular opening through both tablets of the skull, where necrosis had been followed by partial normal repair. Another series of skulls showed a distinct round penetration by some missile entering with force, producing instant death. Some of the professors had constructed an ingenious theory to the effect that these highly civilized Indians—the remains were from the stone graves of Tenn.—must have possessed knowledge of explosives to hurl their missiles with a violence exceeding that of the sling of David. Further examination gave a satisfactory explanation. In the stone war-club, shaped not unlike the starfish, the center was perforated by a large opening, evidently for the admission of a handle, while each of its projections had been roundly polished to about the size of a musket-ball, exactly fitting these penetrating wounds.

At the San Diego Exposition (1913) I examined an extensive osteological collection of Peruvian mummies. Several skulls showed very crude excisions of about an inch in diameter. The excision was made by an instrument of ragged edge used as a saw. Each line showing more or less deep abrasions of the external tablet of the skull. Not a single specimen gave evidence of reparative processes—a fair inference that these wounds were capital operations in a double sense, since the patient did not long survive these efforts of the surgeon's skill!

The medical history of the ancient Peruvians is fragmentary. My folio copy (*Royal Commentaries of Peru,* written by the Inca, Garcellasso de la Vegas) is dated 1638. It deals with the Indian tribes, is a very elaborate account, detailing their political history and civilization. The drugs in common use were emetics and cathartics. The cocoa plant was dedicated to the gods in religious service by order of the Incas. The Spanish medical profession prized it highly. The leaves, mixed with lime, were chewed by the natives to lessen the sensation of hunger and fatigue—a fact which Humboldt records.

Many years ago, my attention was called to its use as a fluidextract by Dr. Henry Thayer, of Cambridge (Henry Thayer Extract Company). Every physician now holds the drug in high esteem for its local effect in the relief of pain in minor surgical operations. The alkaloid cocain, hypodermically employed, is the form in general use.

Brief mention must be made of Galen, who lived nearly five hundred years after Hippocrates. A Greek by birth, he is described as a vigorous, handsome youth. His father was an architect by profession and devoted his life to the education of his son. Left with a fortune at twenty-one, we find him spending the next seven years in travel and study, after which he settled in Rome. Marcus Aurelius offered to make him chief surgeon in his war against the Germans. He was court surgeon. Commodus, the Emperor's son, was placed under his special care. He held a position in the teaching of medicine much like that of the great emperor in philosophy. He antedated Harvey by fifteen hundred years in the discovery of the circulation of the blood. It is remarkable that Galen demonstrated the direct communication which allows the blood to return to the heart through the capillaries, by way of the veins:

"The arteries and veins anastomose with each other throughout the whole body and exchange with each other blood and spirits by certain invisible and exceedingly minute passages."

This imperfect review of our ancient art is fitly closed by the opinion concerning its value, contained in the introduction to Dr. Laurence Heister's famous work, *General System of Surgery,* translated from the original Latin (London, 1750). This translation is one of my treasures in medical literature, often consulted and never without reverence. Heister had his surgical training on the battlefields of Belgium and Flanders (1708–09) and he studied in Leyden under Boerhaave. His book was written as a manual for students:

"To say truth, I cannot help believing with Celsus and others, that Surgery is more ancient than any other branch of Physic, and near coeval with mankind, and therefore the parent of Medicine. The nearer mankind was to its first original, at so much the greater distance were they from luxury and debauchery, and of consequence so much the farther removed from internal diseases. The native strength of man, as yet unhurt by intemperance, stood in no need of internal aids. But, on the other hand, even in the earliest times, men were liable to external injuries, which require the assistance of the Surgeon's hand; for who those days was secure from falling, or from Fractures of the Bones, which are the consequences of such accidents; from the Bites of Wild Beasts; or from the Wounds of an open or insidious Enemy?"

. . . . . .

"By as much as we can collect from ancient History, the Chaldeans and Egyptians, who were the first cultivators of Science, found Surgery naked and in her infancy, enriched her with new experience, and laid her down Rules and Institutions to walk by, and afterward Surgery was still much farther enriched by the Greeks, those ancient and noble patrons of knowledge. Apollo and his son Aesculapius were chiefly celebrated as Surgeons in those ages, who for their sagacity in cultivating this Science, gained to themselves so great applause, that they were reckoned among the number of the Gods. After these came the two sons of Aesculapius,

who accompanied Agamemnon to the Trojan War, and were of great service to the Army. But Homer never takes any notice of them as being serviceable in the Plague or other kinds of distempers, but only as Persons skilful in healing Wounds by the application of Instruments and Medicines. From whence it appears that they were only expert in Surgery, and that it is the most ancient branch of Physics. We read of Chiron the Centaur and other Surgeons after them, who equalled them in reputation. . . . Hippocrates the Coan seems to have far exceeded all the rest in sagacity and industry; Celsus declares of him, 'that he was not only celebrated for Wisdom and Art, but for Eloquence also.' He inherited Surgery by descent, being sprung from the race of Aesculapius. With no less judgment than labour he formed a complete System of the Experiments and Rules of his Ancestors, with their methods of Cure, and with the assistance and directions of Democritus, made a great progress in the study of Human Anatomy. For which reason, they are by no means deceived who have pronounced Hippocrates the Father of all Branches of Physic, but more particularly of Surgery. The writings of this great Man, notwithstanding they are the most ancient, so far exceed all the rest, that at all times they have been laid down as examples to all Professors of Physic."

The Church dominated Roman civilization during the Middle Ages. Medical science, including military surgery, languished in common with other branches of exact knowledge. During this period medicine found refuge among the Arabians, especially in the universities of the Spanish Saracens. The School of Salerno harbored scholars from the East, whether Arab or Jew. The Canon of Avicenna was the text-book in the medical schools of the Arabians and Europeans. Europe had no knowledge of the Greek authors except through the translations of the Arabians. To Avicenna has been ascribed the use of the animal tendon as ligatures; he is said to have employed the strings of musical instruments.

As order began to emerge from the chaos of barbarism, medicine was chiefly practiced by monks and priests. Before 1500, human dissections were prosecuted at Padua and Bologna. The physician, forbidden to shed blood, relegated his surgery to his inferiors—the barber-surgeons. The most famous of these was Ambroise Paré (1510–1590), who served as surgeon with the French army in Provence. He substituted the ligature instead of cautery to restrain hemorrhage after wounds. He made Paris a center of medical teaching in later years.

I have his monumental book (1561), said to be the first illustrated by woodcuts. He dedicates it to the King: "God is my witness, and men are not ignorant of it, that I have laboured more than forty years to throw light on surgery and bring it to perfection. And in this labour I have striven hard to attain my end, that the Ancients have naught wherein to excel us save the discovery of first principles; and posterity will not be able to surpass us (be it said without malice or offense) save by some additions such as are easily made to things already discovered." Paré was a contemporary of the great anatomist—

Vesalius, Andreas (1514–1564), Belgian by birth. He began his studies at Louvain, whence he went to Italy, lecturing at Padua. His fame drew the attention of Charles V, who made him court physician, a position he continued to hold under Philip II. He lived in Madrid. Tried and condemned to death by the Spanish Inquisition, his sentence was commuted by the King to a pilgrimage to the Holy Sepulchre. He perished by shipwreck on the return voyage on the island of Zante. His work on Anatomy is a masterpiece.

The Campaigns of Cortez opened an interesting chapter of the medical knowledge and practices of the semicivilized people of Mexico.

In his *History of Mexico*, the Spanish Abbé Clavigero writes: "Among other arts exercised by the Mexicans, that of medicine has been entirely overlooked by the Spanish

historians, although it is certainly not the least essential part of their history. . . . Those who followed the profession of medicine instructed their sons in the nature and differences of the diseases to which the human frame is subject, and of the herbs which Providence has created for their remedy, the virtues of which had been experienced by their ancestors." Dr. Hernandez, physician to Philip II, King of Spain, was much renowned for the works he published on natural history. He was sent by that monarch to Mexico to study the natural history of that kingdom. He employed himself there with other able learned naturalists for several years, assisted by the Mexican physicians. They communicated to him the knowledge of twelve hundred plants. "Europe has been obliged to the physicians of Mexico for tobacco, American balsam, gum copal, liquid amber, sarsaparilla, jalap, the purgative pine-seeds and other simples much used in medicine." This work of Hernandez consisted of twenty-four books of history and eleven volumes of excellent figures. Its cost was sixty thousand ducats.

Of surgery Clavigero writes: "Blood-letting, an operation which their physicians performed with great dexterity and safety, was common among the Mexicans and other nations of Anahuac. . . . With respect to the surgery of the Mexicans, the Spanish conquerors attest their expedition and success in dressing and curing wounds. . . . For fractures they employed the Nacazol. After drying and reducing the seed of this plant to powder, they mixed it with a certain gum and applied it to the affected part, covered the part with feathers, and over it laid little boards to set the bones. . . .

Cortes himself being in great danger from a wound he received on his head in the battle of Otompan, was greatly relieved and at last perfectly cured by the Mexican art of surgery." The use of the powder, gum, and feathers mentioned above involves the principle of the seal, devised years ago in my own practice, of contractile collodion, reinforced

by a few fibers of absorbent cotton, applied to aseptic wounds.

Among the means which the Mexicans employed for the preservation of health, that of the bath was very frequent, even many times in the same day. Experience taught the Spaniards the advantages of bathing in that climate and particularly in the hot countries. The Mexican vapor bath is built of bricks in the form of a bake-oven. A furnace of stone or brick is outside opposite the entrance. The part which unites the furnace to the bath, and which is about two and a half feet square, is closed with a slab of porous stone. The patient lies upon a mat, water is poured upon the heated stone slab from which a thick steam arises, the attendant driving it downward upon the ailing part, at the same time heating that part gently with a bundle of herbs, previously softened in warm water. The sick person falls into a profuse sweat which relieves the ailment. These baths are common in every Indian village.

We turn aside from this interesting, but imperfect, review of our ancient art to speak of the great English masters:

Percival Pott (1713–1788) was for a long time the leading surgeon of London. His great work in three volumes I have found a mine of instruction. His studies of hernia alone render him famous, while the angular caries of the spine is known to this day as Pott's disease. As a student of Lewis A. Sayre, of New York, I became deeply engaged in the study of this disfiguring disease. Sitting in his famous library, three stories shelved with books to the very roof, he turned one day to Pott's Surgery, saying, "If I had not been so ignorant of Pott's remarkable teaching, I should never have dared suspend my patients for the correction of the displaced vertebræ and fixation by the plaster jacket, for old Pott conclusively demonstrated that it was dangerous and impossible."

Of the Hunters, William and his brother John, much suggests itself. William's exhaustive work upon pregnancy

remains our final authority; it is not too much to say that John Hunter placed surgery upon a scientific basis. He was Pott's assistant for three years. His brother William enrolled him (1755) as a classical student at Oxford, but because he was then twenty-seven years of age, he felt it important to devote himself immediately to the study of medicine. A rival, criticising him for his ignorance of the ancient classics, was met by the characteristic retort, "Foote accuses me of not understanding the dead languages; but I can teach him that on the dead body which he never knew in any language, dead or living!" For years, Hunter was accounted the leading surgeon of London and was the receiver of a large income. He cared for money, however, chiefly for the support of his research laboratory, said to have cost him three hundred thousand dollars—a great sum in those days. He accepted a very few promising students for a fee of one hundred pounds each per annum. The master and his disciples met for work at five o'clock in the morning. He left the laboratory at nine, outlining their work for the day, saying, as his carriage was announced, "I must now go in quest of the damn guinea with which to pay the bills!" Fortunately Hunter's works are published *in extenso.* Years ago, I was granted the rare privilege of examining his specimens taken from the cases in the great Hunter museum and making a careful study of his wonderful preparations, then over a hundred years old. The arteries, veins, and lymphatics were injected as no one had done before him; they are still in as excellent preservation as when fresh from the master's hand.

Sir Astley Cooper (1768–1841) deserves more extended mention than this hasty review admits. To me he has long been the ideal and the exponent of the best in the surgery of one hundred years ago. His personal contact with John Hunter and the enthusiasm derived from Hunter's work, generated a like spirit in himself. He lived in an era of great events. In France, Louis XV was on the throne. The great Frederic of Germany had conquered his enemies and was

the hero of the German people. George III was the young King of England. Cooper was chief Surgeon to two Kings, George IV and William IV. He was chief English surgeon in the battle of Waterloo. His students came from all parts of the world and are said to have numbered, in all, over eight thousand. I advise surgeons of this day to familiarize themselves with the work of this master. His publications upon hernia, in two folio volumes, have never been excelled. Cooper's illustrations of the conditions delineated are full size—the work of artists; they are said to have cost five thousand pounds sterling. As a result of years of search, I at last became the owner of both editions, published in 1804 and 1827. Few living surgeons know the value of this masterly production except by name and quotation. My cherished purpose had been to reproduce these illustrations from the original copper plates. I sought the great house of Langham & Co., London. A careful search was instituted among their archives, only to find that these precious plates has been recently melted. So far as could be learned, mine was the only inquiry ever made for them. Appleton & Co. allowed me free selection from these special illustrations, reproduced for my own quarto work on Hernia, at a cost a little in excess of six thousand dollars.

This fascinating study of the masters in Medicine and Surgery must end with a mere reference to American surgeons, a subject deserving of an entire volume. I close with the injunction that every student ought to profit by the history of the past, not feeling as young surgeons often express themselves, that the Alpha and Omega of science is contained in the text-books of today.

American Surgeons—Anesthesia.—The mental processes are not unlike in all generations. The problem for the care of the sick and wounded has been ever present and laborers have not been few or inefficient. Opium in its various forms has been in common use for centuries. Poets have sung the virtues of the vine from time immemorial.

Timothy said: "Keep thyself pure. Drink no longer water, but use a little wine for thy stomach's sake and for thine oft infirmities." Dr. Keen states, "It is a striking commentary on the immediate results of anesthesia, that in the five years before the introduction of ether (1846), only one hundred and eighty-four persons were willing to submit themselves to such dreadful ordeals in the Massachusetts General Hospital. During 1898, in the same hospital, over seven thousand operations had been performed."

Alcohol in some form has been given in all times to lessen the pain of patients about to be operated on. The ancient annals of Egypt tell of certain drugs administered for this purpose. So far as I have been able to learn, not a single effort had been made to produce anesthesia by the inhalation of gases until Dr. Long's experiment in 1842. This fact is the more surprising, since it had been frequently observed that asphyxiation by coal and other gases produces complete insensibility and yet was often followed by recovery. In 1862 I assisted Dr. Henry J. Bigelow in the administration of one of the hydrocarbon series, not unlike gasoline. Insensibility was produced, but with nearly fatal results.

The new era of surgery which followed the safe demonstration of anesthesia is the great corner-stone of modern surgery, equalled only by Mr. Lister's discovery of the bacterial causes of wound infection and the methods of prevention. Dr. Jameson's experimental studies are worthy of all praise, not unlike those of Lord Lister repeated a half century later and in entire ignorance of Dr. Jameson's work. Of Dr. Nathan Smith, Professor of Surgery in Yale College, much might be written. In 1821, he ligated the ovarian pedicle with narrow strips of leather cut from a kid glove, returned to the peritoneal cavity and closed the incision. Recovery followed. Dr. Charles Bellinger, of Charleston, S. C., 1835, performed a similar operation with like result.

Inspired by Lister's brilliant successes, I broadened the use

of animal ligatures by the closure of all aseptic wounds with buried continuous sutures of catgut. Later I found a safer and much more suitable material—the fine caudal tendons of the kangaroo. This I consider my best contribution to surgery. Sealed with iodoform collodion, the wound dressing is completed before the patient leaves the surgery.

Valentine Mott, of New York, another of Sir Astley Cooper's pupils, was one of America's chief surgeons for many years. Ephraim McDowell, the famous "backwoods surgeon" of Kentucky, was a Virginian by birth. He was the pioneer ovariotomist of the world. His first operation was in 1809. We trace his inspiration and learning back to his student days in Edinburgh.

As an indirect result of the Napoleonic campaigns, Paris became again the center of surgical teaching, to the profit of American students. The most celebrated military surgeon was Baron Larrey, Napoleon's surgeon-in-chief. Our young men flocked to Paris, making the French capital a Mecca of American surgery for the generation preceding our own. Larrey's biography, in two volumes, is worthy of study. I digress by mentioning a fact, so far as I know unpublished, which may have affected the course of European history. Napoleon was an epileptic. He left orders to be called at four in the morning of the battle of Waterloo. That night he was seized with an unusually severe epileptic attack and Baron Larrey allowed him to sleep until six. Who shall say that the destiny of Europe was not decided by those fateful two hours?

The brothers Atlee and Drs. Dunlap, Peaslee and Kimball, names high on the roll of honor, bring us to our Civil War, and this opened a new and the greatest era in American surgery. My master, Prof. Virchow, in his presidential address before the International Medical Congress at Berlin, stated, "it must be acknowledged that America now holds the first place in the record of surgical science." This is probably true. The rivalry between the European schools

has been bitter, and the unbiassed American student has been able to profit by all. A long list of the leaders in surgery in this generation could be added. Their names are well known to most of the members of this Association. I am glad to add that nearly all have been personal friends.

I quote from the *Story of My Life*, by J. Marion Sims (1884, Appleton & Co.), the following remarkable experience. Under the supervision of a group of noteworthy Paris surgeons, a patient was resuscitated after repeated efforts, when a fatal result seemed inevitable:

"Dr. Campbell was the greatest accoucheur of Paris at that time. He was in the habit of giving chloroform to his patients in labor, and was selected by the family to give the chloroform because of his known reputation in using it. The operation was begun at ten o'clock in the morning of the 19th of December, 1861, Dr. Nélaton, sitting by and watching every stage of it with the greatest attention. At the end of about forty minutes all the sutures were introduced and ready to be secured. Just at this time I discovered a certain amount of lividity in the mucous surfaces, and I called Dr. Nélaton's and Dr. Johnstone's attention to it, and said, 'It seems to me the blood is stagnating.' I asked Dr. Campbell if the pulse and respiration were all right; he said 'Yes, all right; go on.' Scarcely were these words uttered when he suddenly cried out, 'Stop! Stop! No pulse, no breathing.' And sure enough the patient looked as if she was dead. Dr. Nélaton was not in the least disconcerted. He quietly ordered the head to be lowered and the body to be inverted, that is, the head to hang down, while the heels were raised in the air by Dr. Johnstone, the legs resting one on each of his shoulders. Dr. Campbell supported the thorax, Dr. Herbert went to an adjoining room for a spoon, with the handle of which the jaws were forced open, and I handed Dr. Nélaton the tenaculum, which he hooked in the tongue, pulling it out between the teeth, and gave it in charge of Dr. Herbert, while Dr. Beylard was assigned

to the duty of making efforts at artificial respiration. Dr. Nélaton ordered and overlooked every movement. They held the patient in this inverted position for a long time, making artificial respiration, before there was any manifestation of returning life. Dr. Campbell, who published an account of the case subsequently, said in his report that it was fifteen minutes, and that it seemed an age. My notes of the case, written a few hours afterward, make it twenty minutes that the patient was held in this position. Be this as it may, the time was so long that I thought it useless to make any further efforts, and I said, 'Dr. Nélaton, our patient is dead, and you might as well stop all efforts.' But Dr. Nélaton never lost hope, and by his quiet, cool, brave manner, he seemed to infuse his spirit into his assistants. At last there was a feeble inspiration, and after a long time another, and by and by another; and then the breathing became regular. When the pulse and respiration were well reëstablished, Dr. Nélaton ordered the patient to be laid on the table. This was done very gently, but the moment the body was placed horizontally the pulse and breathing instantly ceased. Quick as thought the body was again inverted, the head downward and the feet over Dr. Johnstone's shoulders, and the same maneuvers as before were put into execution. Dr. Campbell thinks it did not take such a long time to reëstablish the action of the lungs and heart as in the first instance, but it seemed to me to be quite as long, for the same painful, protracted and anxious efforts were made as before. Feeble signs of returning life eventually made their appearance. Respiration was at first irregular and at long intervals; soon it became more regular, and the pulse could then be counted, but it was very feeble and intermittent. When they thought she had quite recovered they laid her horizontally upon the table again, saying, 'She's all right this time.' "

"But the moment the body was placed in a horizontal position the respiration ceased a third time, the pulse was

gone, and she looked the picture of death. But Dr. Nélaton and his assistants, by a simultaneous effort, quickly inverted the body a third time, with a view of throwing all the blood possible to the brain, and again they began their efforts at artificial respiration. It seemed to me that she would never breathe again, but at last there was a spasmodic gasp, and after a long time another, and after another long interval there was a third, and then a fourth more profoundly; there was then a long yawn, and then the respiration became tolerably regular. She was held in a vertical position until she, in a manner, became semiconscious, opened her eyes, looked wildly around, and asked what was the matter. She was then, and not until then, laid on the table, and we all thanked Dr. Nélaton for having saved the life of this lovely woman. In a few minutes more the operation was finished, but of course without any more chloroform. The sutures were quickly assorted and separately secured, and the patient put to bed. On the eighth day thereafter I had the happiness to remove the sutures, in the presence of Dr. Nélaton, and to show him the success of the operation.

"I have detailed the circumstances of this interesting case at great length, because I believe it goes as far to establish the proper method of resuscitation from chloroform narcosis as anything possibly can. If the recovery had been complete and perfect with the first effort at reversing the body, there might have been a doubt whether the vertical position was really the cause of resuscitation; but when the horizontal position was again and again followed by the cessation of all signs of life, and when life was again and again reëstablished by a process that favored the gravitation of the blood, poisoned as it was with chloroform, to the brain, the inference is very clear that death in such cases is due to syncope or cerebral anemia."

"Some years ago there was a story current in Paris that Dr. Nélaton had derived the hint of reversing the body in chloroform poisoning from a discovery accidentally made by

his little boy, then some seven or eight years old, that his little son had killed some mice with chloroform, and without thought or reason he had taken up a dead mouse by the tail and was twirling it around, when to his surprise it began to manifest signs of life, and soon recovered entirely, while the mice left lying were dead; and that the great surgeon was thus taught an important lesson by his little boy. This is a very pretty story, and it seems a pity to spoil it, but lately when in Paris I called to see young Nélaton, who is now a doctor of medicine, and I asked him for the facts of the mouse story. He said that when they lived on the Quay Voltaire the house was infested with mice; that great numbers were caught in traps almost daily; that he was in the habit of killing them with chloroform, by covering the trap with a napkin and pouring the chloroform on it, and that his only idea was that of its being an easy death for the mice. One day, when he had given a happy dispatch to some mice, his father happened to come into the room, and seeing the dead mice, he told his son that, if he would take up one by the tail and hold it with the head downward, it would revive, while the others would not. He did this and found it was true, and he told me that he had, when a boy, performed this experiment on mice some forty or fifty times or more, and always with the same unvarying result. He said that he had often heard his father speak not only of the case that occurred at St. Germain, but of other cases that he had saved before the time of the mouse story, which dates back to 1857.

"In America accoucheurs use chloroform and surgeons mostly ether. I believe there has not yet been a single death from chloroform administered during labor, while deaths from it in general surgery occur constantly, and for unimportant operations. There must be a reason for this. I believe it can be explained only on the theory that death from chloroform is due to syncope or cerebral anemia. Now, we know that in active labor there can be no cerebral anemia,

for every pain throws the blood violently to the brain, producing fulness and congestion of the bloodvessels, thereby counteracting the tendency of the chloroform to produce a contrary condition. It may be said that the recumbent position has some influence in determining the safety of chloroform in labor, and so it has."

William T. Green Morton (1819–1868), an American dentist. He studied in Baltimore and settled in Boston. In his search for means of removing the roots of decayed teeth without pain, he tried stimulants even to intoxication, opium and magnetism. In 1844 he learned that sulphuric ether could be inhaled in small quantities without danger. After experimenting on himself, satisfied as to its safety, he administered it to a man and produced unconsciousness, during which a firmly rooted bicuspid tooth was painlessly extracted. He several times administered ether for surgeons. Dr. I. F. Galloupe, of Lynn, Mass. (surgeon, 13th Massachusetts Infantry, U.S.A.), related to me at considerable length his assisting Dr. Pearson in operating upon patients who had been etherized by Dr. Morton. These operations were prior to the famous one by Dr. J. C. Warren, in October, 1846, in the Massachusetts General Hospital. This demonstration took place in the presence of a number of physicians, its importance and value being immediately recognized.

The heated controversy which ensued between the claimants for priority may well be forgotten. The honor was sufficiently great for all to share. Dr. Morton was undoubtedly indebted to Dr. Charles Thomas Jackson, of Boston, who has never received full credit for his services. His claims are substantially as follows:

"In 1834 he discovered that an alcoholic solution of chloroform, when made to act locally on a nerve, renders it insensible to pain; and that if a piece of lint saturated with a mixture of one part of chloroform and three parts of alcohol, is inserted into the cavity of a tooth, it allays the pain at

once, and by repeated applications completely destroys the sensibility of the nerves. Having long before experimented with exhilarating gas or protoxide of nitrogen, he resumed in 1837 his experiments with that gas in order to test the comparative effects of different modes of administering it; but the only new result he obtained was to satisfy himself that the temporary insensibility which it sometimes produces is due in a greater or less degree to partial asphyxia. Subsequently, but previous to the winter of 1841–42, having received some perfectly pure sulphuric ether, he tried its effects upon himself, administering it with a mixture of atmospheric air, and inhaled it to such an extent as to lose all consciousness, without suffering any of the dangerous or disagreeable consequences that had hitherto attended the inhalation of impure sulphuric ether unmingled with atmospheric air. In the winter of 1841–42, he inhaled ether vapor for relief from the severe pain occasioned by the accidental inhalation of chlorine. The relief he experienced led him to 'infer that a surgical operation could be performed on a patient under the full influence of sulphuric ether, without giving him any pain.' Dr. Jackson's claims to the discovery of anesthetics, disputed by Morton and Wells, gave rise to a long controversy. In 1852 a memorial was presented to Congress, signed by 143 physicians of Boston and its vicinity, ascribing the discovery exclusively to Dr. Jackson. About the same time the question was investigated by a committee of the French Academy of Sciences, and on their report the academy decreed a prize of 2500 francs to Dr. Jackson and another of 2500 francs to Dr. Morton. M. Elie de Beaumont remarked in a letter to Dr. Jackson, May 17, 1852: 'In point of fact, the Academy of Sciences decreed one of the Montyon prizes of 2500 francs to you for the discovery of etherization, and it has decreed a prize of 2500 francs to M. Morton for the application of this discovery to surgical operations.' "

Dr. Jackson received orders and decorations from the

governments of France, Sweden, Prussia, Turkey, and Sardinia. He was an eminent scientist, a graduate of Harvard, had a long period of postgraduate study in Europe and was afterward appointed State Assayer of Maine. The following is an illustration of his valuable public service: As a young boy—about 1858—I well knew Dr. Lucas, of Chester, Mass., He discovered a wide vein of black mineral in the country rock, believed to be iron ore. Since it would not melt in the furnace, a specimen was sent to Dr. Jackson, who pronounced it corundum, then the first discovered in America. Its great value as an abrasive was at once recognized. The product of Dr. Lucas's mine polished practically every rifle bayonet, and sword used by the United States Government in the Civil War.

Dr. Crawford W. Long (1815–1898), of Athens, Ga. He took his classical degree in 1835 and graduated from the University of Pennsylvania in 1839. Dr. J. Marion Sims wrote: "Dr. Long was the first to produce anesthesia intentionally for surgical operations, and this was done with sulphuric ether. He did not by accident hit upon it, but reasoned it out in a philosophical and logical manner. Horace Wells, without any knowledge of Dr. Long's labors, demonstrated in the same philosophical way the great principle of anesthesia by the use of nitrous oxide gas in December, 1844, thus giving Long the priority over Wells by two years and eight months, and over Morton, who followed Wells in 1846." (*Biography of Eminent Physicians and Surgeons*, edited by R. French Stone, M.D., Indianapolis, 1894.)

Horace Wells (1815–1848), one of the claimants for the discovery of anesthesia. He studied and practised dentistry in Boston. On December 11, 1844, profiting by the suggestion of Mr. G. A. Colton, who had witnessed the effect of nitrous oxide gas, he had a large molar tooth extracted without pain. He gave the gas to a number of patients with similar effect. When Dr. Morton received his patent for anesthetic agents in November, 1846, Dr. Wells remonstrated,

adducing the testimony of several surgeons and physicians. The following December he demonstrated his discovery before one of the medical societies of Paris. Nervous prostration followed; he committed suicide in New York. A memorial statue of Wells has been erected in a public park of Hartford, Conn.

An unpublished paper of Dr. Morton's came to my knowledge some years ago. His son, Dr. William J. Morton, of New York, permits me to use it. Dr. John H. Brinton, chief surgeon upon the staff of General Grant, is authority for the manner of obtaining the aid required. Wishing to secure the use of an ambulance for Dr. Morton, although General Grant had refused ambulances for all services except for transportation of the wounded, Dr. Brinton urged his request that it was for Dr. Morton, the discoverer of ether, the greatest blessing to the wounded and the surgeon alike. "Let him have the ambulance and anything else he desires!" was Grant's reply. Brief extracts from this interesting letter follow:

"Upon the news of the Battle of the Wilderness, the surgeon-general ordered me to report immediately to Fredericksburg. We landed nine miles from the little city in an inexpressibly wild and desolate place. The only living things visible were teamsters, wounded soldiers and mounted patrols. In one dreary defile up came four men from behind us and rode past at a brisk trot, two on each side. As they wore the Federal uniform, neither the driver nor myself mistrusted them, until, as if by magic, two, each seized one of our leading horses, while the other two cut the reins and traces and away they went. They were a quartet of guerillas who thus helped themselves to a good pair of Uncle Sam's horses, leaving us to pursue our journey with a single pair instead of a four-in-hand.

"At last we rattled over a pontoon bridge and entered the remains of the war-desolated little city of Fredericksburg, once one of the most beautiful and flourishing places in

Virginia. At first there was confusion and lack of supplies, causing much suffering and discomfort. But Surgeon Dalton, the efficient medical director, soon had everyone made as comfortable as circumstances would permit, and the Sanitary and Christian Commissions did their share of the noble work. Scores of volunteer nurses, State relief agents, and other good Samaritans did what they could to relieve the necessities and alleviate the suffering of these brave wounded men. The ambulances could not have brought one-tenth part of them; the rest were brought in wagons eleven or twelve miles over the remains of a plank road worn by war travel. In places the larger wagons had to be pried out of the deep holes with trimmed trees. The delays of the entire train from this cause were frequent and long. The depth of these holes, and the instinct and habit of the lead and middle teams of mules to trot away from a wagon in a sudden descent in order to escape the whipple-trees, inflicted on the unfortunate wounded blows and jars excruciatingly torturing, and that wasted their vitality. Over every rod of the way, and in the best two-horse spring ambulances, a jarring motion was communicated by the absence of half the planks on the planked side of the road, and the ruts and holes cut into the clay side during a week's rain by the transportation machinery of an army of one hundred thousand men. On such a highway and in such a manner did these poor fellows, who stretched their hands out of these ambulances and army-wagons for tincupfuls of water, painfully travel, some with arms off at the shoulder; some with legs off above the knee, some with an arm and leg both off, hundreds shot through the leg or arm or breast, some with horrible wounds of the face—even to the loss of the jaw and the destruction of speech—all presenting in the aggregate every possible variety of gunshot wound.

"Having been assigned quarters in a fine old mansion, I commenced going the rounds of the buildings used as hospitals to administer anesthetics. There was at first a lack of

supplies, and many of the wounded who had been jolted over hard roads some eight and forty hours were in a bad condition. Several hundred, packed into a church or hall without change of clothing or washing, made the atmosphere unbearable almost, and gangrene and erysipelas began to make their appearance, but this was soon remedied. One of the principal hospitals was the Baptist Church, which was literally packed with wounded. The tank intended for immersion was used as a bathing tub, and the operations were performed in the pastor's small study back of the pulpit.

"It was a noteworthy fact that, although each of the great armies which met in the Battle of the Wilderness had at least two hundred and fifty pieces of artillery, there were not in the hospitals of Fredericksburg a dozen men wounded by cannon shot or shell. Out of the 3000 reported wounded in Hancock's command, not one had received a shot or shell wound from artillery. It was also noticed that many of the wounds received were caused by balls which had glanced from trees or rocks, inflicting comparatively slight injuries. I was informed by a division surgeon that out of about 1000 wounded under his charge not over 30 were permanently disabled.

"By Thursday, May 12, the wounded at Fredericksburg were all well cared for. Surgeons and nurses arrived. The Sanitary and Christian Commissions were actively at work. All patients who could bear transportation were being sent away, and I was beginning to think of making a visit to the front, when a summons came, requesting me to hasten thither. There had been fearful fighting, as General Grant has swung round his army out of the bloody Wilderness, and he now faced Spottsylvania Court House. Leaving Fredericksburg with an officer of my acquaintance, we started for headquarters. Just out of the town we met four or five hundred army wagons, each with its four or six horses or mules, ready for service, yet near the supplies of forage. There were also large droves of cattle, brought from the Western States for

the use of the army, and killed as they were needed. The road, if road it may be called, was wretched indeed, the horses often sinking in mudholes to the saddle girths. Through this ambulances and wagons were floundering along, carrying wounded to Fredericksburg, while others, only slightly injured, plodded along on foot. Occasionally we passed an impromptu camp where the slightly wounded men had stopped to rest, and several newly made graves showed where some poor fellows had made their last halt.

"Just then several wounded rebels were brought up on stretchers, and the surgeon in charge, who had known me after Burnside's attack on Chancellorsville, invited me to administer anesthetics, which I did. All of them had limbs amputated and seemed very grateful afterward for the kind treatment they received.

. . . . . .

"On the arrival of a train of ambulances at a field hospital, the wounds were hastily examined, and those who could bear the journey were sent at once to Fredericksburg. The nature of the operation to be performed on the others was then decided on and notes on a bit of paper pinned to the pillow or roll of blanket under each patient's head. When this had been done, I prepared the patients for the knife, producing perfect anesthesia in an average time of three minutes, and the operators followed, performing their work with dexterous skill, while the dressers in their turn bound up the stumps. It was surprising to see with what dexterity and rapidity surgical operations were performed by scores in the same time really taken up by one case in peaceful regions.

"When I had finished my professional duties at one hospital I would ride to another, first arranging at what hour I would next return. Dr. Armstrong, of the 11th Virginia Cavalry, dressed the wounds of our men and showed them great kindness, for which act of humanity his name deserves honorable mention.

"I had been introduced to General Grant at Washington, and he at once remembered me and gave me a kindly welcome. Had I not previously known him, I should never have dreamed that so unpretending a person was commander of so mighty a host.

"For myself, I am repaid for the anxiety and often wretchedness which I have experienced since I first discovered and introduced the anesthetic qualities of sulphuric ether, by the consciousness that I have thus been the instrument of averting pain from thousands and thousands of maimed and lacerated heroes, who have calmly rested in a state of anesthesia while undergoing surgical operations which otherwise would have given them intense torture. They are worthy of a nation's gratitude—happy am I to have alleviated their sufferings. For the dead heroes we mourn—but let all the patriotic benevolence and science and philanthropy of the Republic be brought into requisition for the benefit of the wounded."

In discussing the subject of anesthesia there is a strong temptation to wander in the by-paths of experience. When a student in London, in 1870, Sir James Paget asked me whether, since I hailed from Boston, I had ever given ether, and if so would I be willing to administer it to a patient in his clinic. He added that within the last few weeks there had been twelve deaths from chloroform, that he had heard it claimed ether was attended with less danger; but so far as he knew it had never been used in London, chloroform, administered by the drop method and with the greatest care, being employed.

There was rolled into the amphitheater a thin nervous woman of middle life; with much misgiving I anticipated a scene. Upon a thick towel, folded as a cone, in a distinctly demonstrative way, I poured the ether freely, at the same time whispering the patient to breathe slowly and deeply through the mouth and, in a semiprone position, she had nothing to fear. Without a struggle, in a remarkably short

time, she was fully narcotized. Needless to say the operation was satisfactory, and I received a noisy demonstration of applause. Dr. Morton himself—he was still in active life—would have been delighted over this surgical anesthesia in a London hospital.

I was still in London when we were shocked by the sudden death of Sir James Y. Simpson. He had justly considered that his discovery of chloroform was his greatest contribution to surgery, and stoutly maintained that the fatal effects attributed to its use were the result of ignorance or careless administration. Sir James, though active, had not been well. He had been called to London upon an emergency consultation in behalf of a member of the Royal family, and had ridden from and to Edinburgh by night journeys. The following day he was to operate on a young woman seemingly in fair health. Chloroform was administered by an assistant, but tragedy came unheralded and death supervened before the operation was even begun. This calamity was too great for the rugged veteran. Angina pectoris ensued, and the medical world mourned the loss of one of its most famous contributors. It had been my purpose to spend the summer studying with this master, instead I made a pilgrimage to his new-made grave. For a wide area about it the green sod had been trampled and destroyed, not wantonly, but by the feet of those unnumbered and sympathetic friends who came to pay a heartfelt tribute to their loved benefactor.

Though fate had robbed me of a summer's study with Sir James Y. Simpson, I determined to remain in Edinburgh and profit by a prolonged sojourn in that medical Mecca of the preceding century. I thought of Syme, but a few days later found me a sympathetic mourner in a crowded assembly of his lifelong friends. Inquiring of a young local surgeon standing beside me regarding the identity of one of the chief mourners upon whose arm leaned heavily a tall lady draped in black, I was met with the response, "That is a son-in-law, Joseph Lister, from Glasgow. But for the family relationship

he would not be here." The medical profession looked upon Lister as an undesirable addition to their ranks. His contributions to surgery had been regarded, if not misleading, of little value. It must be confessed that curiosity rather than a desire for instruction prompted me to seek an introduction. I was kindly received. After a long morning spent with his patients, I was convinced of the correctness of the fundamental principles of Lister's teaching. Until that morning I thought I knew surgery, but his demonstration gave promise of a new era in its practice.

The months went by all too quickly. I returned home the enthusiastic devotee of Joseph Lister, forgetting that up to this time the master had convinced few and had contributed little of material value to the profession. Some of my readers know of the long struggle which followed my attempt to introduce into this country his methods of surgery. Ruled out of public service, I was obliged to open a private hospital. Here I established a laboratory with two of the best assistants obtainable, devoting some fifteen years to continuous bacteriological studies. Reference is made to this, because the work afforded special opportunity to observe surgical anesthesia both in man and animals. Blood-pressure was carefully noted by the new instruments then coming into use. The conclusion was reached that, with chloroform especially, the lowering arterial current was the chief cause of danger. My attention was called to the fact that its use in the dental chair was far more dangerous than when the patient was upon the table where the position could be easily reversed. Finding that a free inhalation of oxygen might be of the greatest value, I carried oxygen gas through a jar containing chloroform with the happiest results. I have followed this method for years until the present, although the doing so places me almost alone among the surgeons of Boston and have for the most part used chloroform as an anesthetic. It must be administered with much greater care than ether, but seemingly dangerous conditions have rarely followed in

my hospital experience. Nitroglycerin and strychnin, hypodermically given, almost invariably precedes an operation. A careful study of every patient is demanded prior to the administration of the anesthetic.

Ether anesthesia has a distinctly different effect upon the organism from chloroform. It is closely related to that of alcohol from which it is a derivative. It is remarkably volatile and through the respiratory processes speedily produces the role of intoxication. One of its remoter dangers is often too lightly considered. It rapidly changes the circulation in the lung, lessening the blood-supply, and is not infrequently succeeded by a distinct irritation of the bronchi which may extend to the alveolar structures. Bronchopneumonia following ether is more common than is generally believed and not seldom a direct cause of death.

Marion Sims thought he had arrived at a happy solution of the problem of etherization by placing a sponge in a large lamp chimney fitted with a mouthpiece. This contrivance first drew my attention to the remarkable refrigeration of ether. The chimney speedily became unpleasantly cold and not seldom the saturated sponge was frozen. I consider it a great advance to protect the ether vapor from too rapid cooling. This is one of the prime advantages of the Bennett apparatus, still in general use.

My late friend, James A. Woolson, for many years one of Boston's wealthy and influential business men, told me of his experience as a poor boy of sixteen with the genial dentist, Dr. Morton. The usual fee for extraction was twenty-five cents a tooth. The doctor told him that for fifty cents he would remove the offending member without pain. "Dr. Morton," was the response, "I can't afford it. I shall have to be hurt." The doctor looked sympathetically at the boy and said, "I like your frankness. You shall take a few whiffs of the gas without cost." The difficult extraction proved painless; Dr. Morton won a friend who later was instrumental in helping to erect the ether monument in our Public

Garden. Years afterward, Mr. Woolson said, "I pass it only with uncovered head in memory of the great benefactor."

Local anesthesia of cocain and its derivatives is in favor for minor operations—the present tendency is to give it undue preference in major operations. In fairly normal physical condition the patient had best submit to the profound narcosis of an anesthetic. The nerve strain to a patient undergoing any considerable operation—even without pain—should be eliminated as far as possible to avoid nerve shock. The surgeon himself is a better master of the situation when his patient is unconscious. Exigencies may arise of which the latter should remain ignorant. The following seriocomic illustration makes clear my meaning. One of New England's early leading surgeons was given to soliloquizing. In an abdominal operation, then rarely undertaken, his assistant heard him mutter in a low but distinct tone, "Bad accident—I cut a gut." Later he reported to the friends: "I fear the patient will die. Conditions were far more serious than I expected to find them."

In the more recent period spinal anesthesia has been used. Many of its advocates are enthusiastic over its results and convinced of its permanent value. It is an accessory to the surgeon's armamentarium in exceptional conditions. For many and obvious reasons it is not adapted to general use.

HAND METHOD FOR DEMONSTRATING THE MECHANISM OF LABOR AND TYPES OF PELVES

By John F. Moran, M.D.
Washington, D. C.

The hand method for demonstrating the mechanism of labor and the types of pelves is the outcome of an observation, made sometime ago, when, explaining to the husband of a patient the reason of the tedious labor in occipito-posterior presentations, I found myself using my hands to show how the child passes through the birth canal.

Impressed with the facility, simplicity and clarity of the maneuver, its further possibilities as an aid in comprehending and visualizing the various steps in the mechanism appealed to me. With this idea in view, I have evolved a series of hand movements by which I am able to demonstrate the mechanism of the various presentations in normal and abnormal labor and also to depict the different types of pelves.

The closed hand or fist represents the child's head and the upturned hand, with fingers apposed, extended and slightly curved, together with the extended thumb represents the pelvic canal. The closed hand serves very well to show the topography, obstetrical landmarks and diameters of the child's head (Fig. 1). The wrist corresponds to the neck; the metacarpophalangeal joint of the thumb, to the occipital protuberance; the flexed thumb under the index finger to the lambdoidal suture and posterior fontanelle; the second

Vertex
Ant. Fontanel
Post. Fontanel
Sinciput
Occiput
Sub Fronto-Occipital
Occipito-Bregmatal
Suboccipito Frontalis
Occipito

Fig. 1

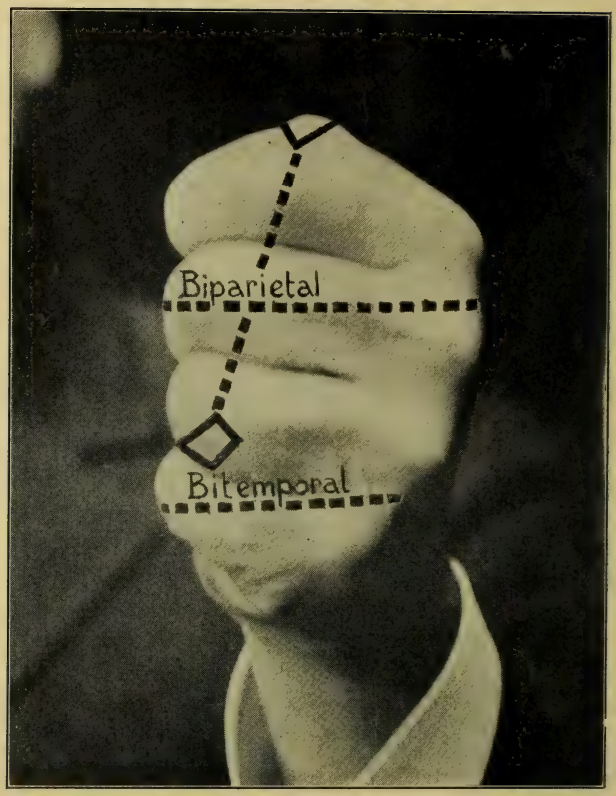


Fig. 2

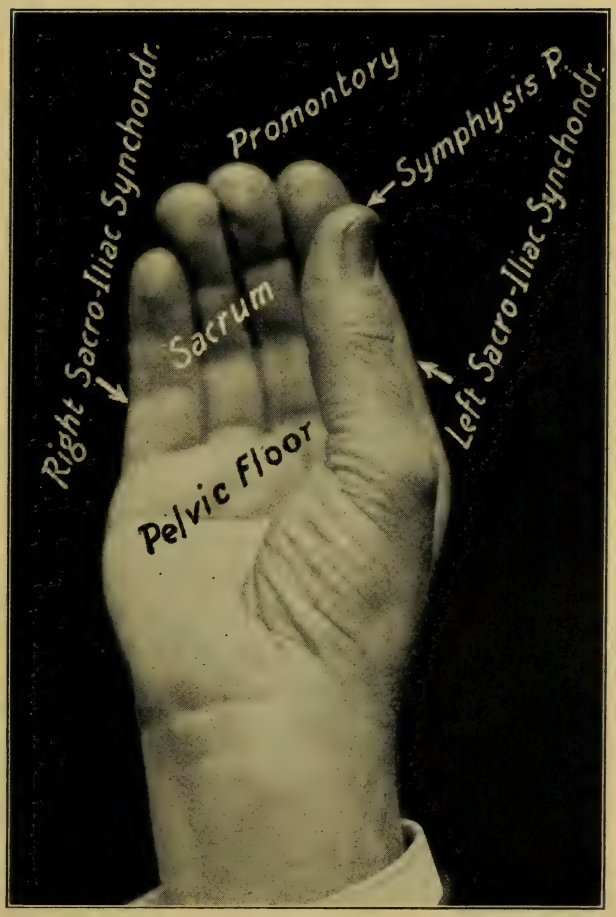

Right Sacro-Iliac Synchondr.
Promontory
Symphysis P.
Left Sacro-Iliac Synchondr.
Sacrum
Pelvic Floor

Fig. 3

FIG. 4.—Line *A* indicates the superior strait or plane of inlet. Line *B* indicates midplane of pelvis, the plane of greatest expansion. Line *C* indicates the plane passing through the spines of the ischium, the plane of least expansion.

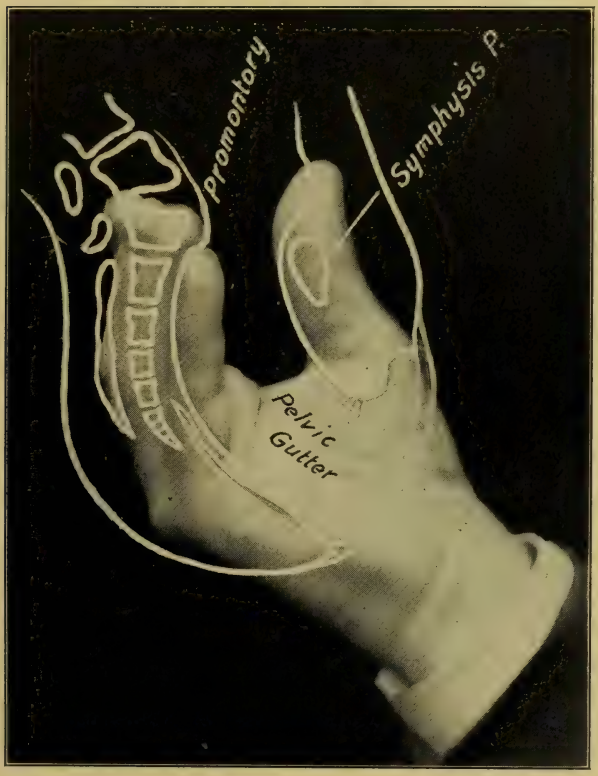


FIG. 5.—Showing pelvic floor or gutter, sacrum and symphysis pubis.

FIG. 6.—Represents the head engaged in the inlet, occiput to the left and interior, corresponding to the L.O.A. position. (Engagement and flexion.)

FIG. 7.—The head has descended to the pelvic floor, still in the right oblique diameter. (Descent.)

FIG. 8.—The occiput has rotated inward and forward to the symphysis. (Internal rotation.)

FIG. 9.—The head is undergoing extension and extrusion.

Fig. 10.—External rotation, L.O.A. position.

Fig. 11.—Left occipitoposterior position.

Fig. 12.—Head descending in the left oblique diameter, occiput directed posteriorly.

Fig. 13.—Occiput has rotated into cavity of sacrum instead of anteriorly.

Fig. 14.—Left occipitoposterior being borne by extreme flexion.

Fig. 15.—Brow presentation.

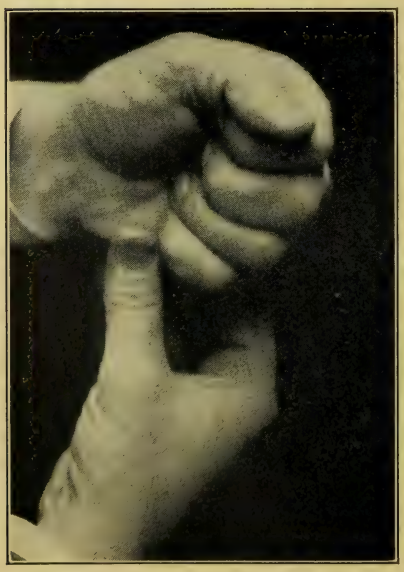


Fig. 16.—The face engaged in the inlet, chin directed to the right and anterior, corresponding to the right mento-anterior position.

Fig. 17.—The face on the pelvic floor and chin rotated to the symphysis. (Descent and rotation.)

Fig. 18.—The face extruding through the vulva. (Flexion.)

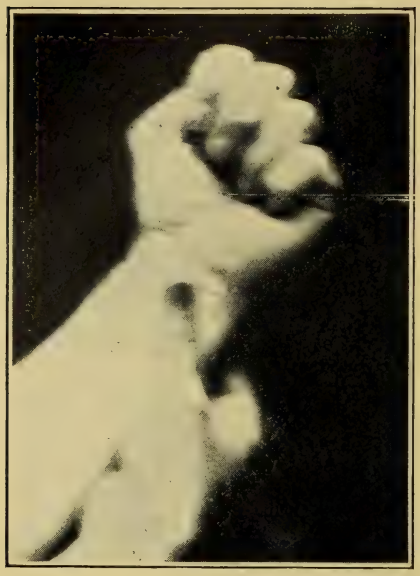


Fig. 19.—Breech presentation.

Fig. 20.—Birth of after-coming head in breech presentation.

Fig. 21.—Transverse presentation.

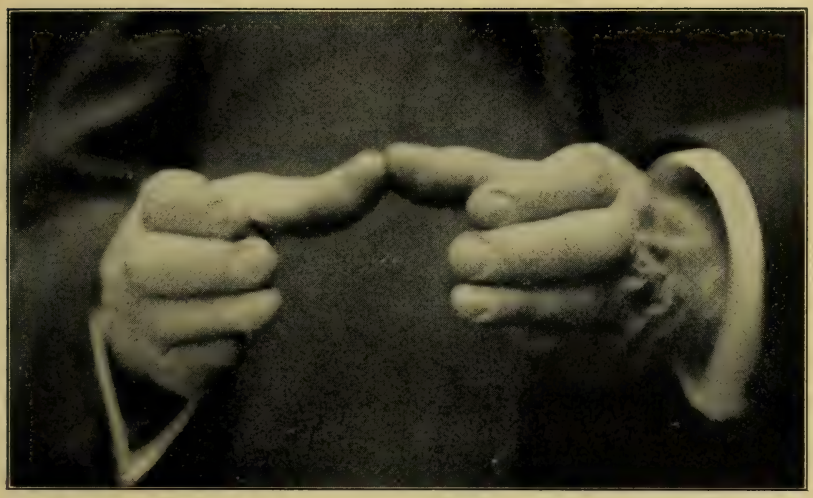


Fig. 22.—Normal relation of the spines and crests of the ilium.

Fig. 23.—Conjugate vera of normal pelvis.

Fig. 24.—Conjugate vera of justo-major pelvis.

Fig. 25.—Obliteration of the curve of the sacrum in rhachitic pelvis.

Fig. 26.—Heart-shaped inlet. Normal pelvis.

Fig. 27.—Oval shaped inlet.

Fig. 28.—Inlet of simple flat pelvis.

Fig. 29.—Oblique contraction of the inlet. (Naegle pelvis.)

Fig. 30.—Transverse contraction of the inlet. (Robert pelvis.)

Fig. 31.—Shows figure-of-eight inlet. (Rhachitic pelvis.)

Fig. 32.—Beak-shaped inlet of rhachitic and osteomalacic pelves.

row of phalangeal joints and the phalanges on both sides, to the sagittal suture and parietal bones; the fold between the second joints of the ring and little fingers, to the site of the anterior fontanelle, and the ulnar aspect of the hand, to the sinciput and face. It will be observed that the diameters as shown in Figs. 1 and 2 correspond to those of the head of the child.

In the front view of the upturned hand (Fig. 3) the fingers represent the anterior aspect of the sacrum; the palm of the hand, the pelvic floor or gutter, and the thumb, the symphysis. A view from the radial side (Fig. 4) shows a sagittal section of the pelvic canal showing the sacrum with its promontory, indicated by the tips of the fingers and the vertebræ by the phalanges and the thumb in front representing the symphysis. The planes of the inlet, the greatest expansion and least expansion of the pelvis are represented by the lines *A*, *B* and *C* (Fig. 4). The ulnar aspect shows, in addition to the above, the pelvic gutter (Fig. 5).

The several positions of the various presentations can be shown by the hand method, likewise the mechanism of each demonstrated. Figs. 6, 7, 8, 9 and 10, with their legends, explain the various steps of the mechanism in occipito-anterior positions, in which the occiput rotates forward to the symphysis, through an arc of 45 degrees. Figs. 11 and 12 illustrate engagement and descent in occipitoposterior presentations. As a rule, the occiput rotates forward as in anterior positions, but through an arc of 135 degrees. When, however, owing to interference with flexion the sinciput is directed forward to the symphysis and the occiput passes passively to the hollow of the sacrum (Fig. 13), the sinciput stems under the symphysis, the head becomes markedly flexed and lengthened in its occipitomental diameter and is extruded through the vulva with face to pubis (Fig. 14).

In brow presentation the head engages in the inlet midway between flexion and extension (Fig. 15) and is generally converted spontaneously into either a face or vertex presen-

tation. Rarely passage through the birth canal is possible by mechanism similar to the persistent occipitoposterior position.

In face presentation the head engages and descends in extension (Fig. 16), the chin rotates to the pubic arch (Fig. 17). Flexion then takes place and the nose and eyes sweep over the perineum, followed by the occiput (Fig. 18). To show the breech presentation (Fig. 19) the arm represents the body and the reversed fist the after-coming head (Fig. 20). Transverse presentation (Fig. 21), is represented by the arm presenting at the inlet with the fist directed to the iliac fossa.

The hand method also provides for the demonstration of the mechanism in flat and contracted pelves and is graphically illustrated in the motion-picture production. The different types of pelves as expressed at the inlet are illustrated in Figs. 22 to 32.

I have employed the hand method of demonstrating the mechanism of labor to my classes during the past two sessions, and find that, by its compelling visualization, the different phases of the process are easily followed and understood. My associate, Dr. Lowe, in charge of the manikin demonstration for a number of years, tells me that since the introduction of the method the students show, by their aptness in the practical work, a good knowledge of the mechanism of labor.

In conclusion, I wish to express my appreciation for the excellent photographs prepared by Mr. De Lancey Gill, illustrator, Bureau of Ethnology, and to thank Col. W. O. Owen, U. S. A. (retired), in charge of the Instruction Laboratory of the Museum and Library Division of the Surgeon-General's Office, under whose supervision the motion picture was made for educational purposes. I am also indebted to Lieut. Charles Wallach for the film production and to Sergeant Vernon Sisson for the art work.

DISCUSSION

THE PRESIDENT.—So far as I know this demonstration has never been made before any medical society. It is a rather new method of demonstration, and I know Dr. Moran would be glad to have any suggestions made by any of the members present.

DR. HOWARD A. KELLY, Baltimore, Md.—It was interesting to watch Dr. Moran hold his hand so steady with every manipulation. I think it would be a help to some of us to use a little India ink so as to be able to bring out the different parts and familiarize ourselves with the landmarks, showing the different relations; otherwise we do not know what is represented in different parts of the hand.

DR. J. WHITRIDGE WILLIAMS, Baltimore, Md.—I have watched the presentation of these pictures with great interest. The whole matter of teaching the mechanism of labor is very difficult and it is the most unsatisfactory feature of our obstetrical instruction, and we should, therefore, welcome any method which makes it more graphic. Dr. Moran's demonstration is a revelation to me. Doubtless it can be improved as time goes on, but even as it is it will be of considerable value in teaching, as it makes a number of things clearer to students than the ordinary verbal descriptions or the diagrams which we can show them.

DR. MORAN (closing).—We still have in mind the further development of this line of work for the purpose of teaching as well as for visualization and elucidation of the text-book description of the mechanism of labor. We have in course of preparation now, for instance, an animated picture of the action of the uterus during labor which we hope to present at some later date.

NOTE.—The animated picture demonstrating the action of the forces in labor has been completed, and in conjunction with the hand method greatly aids in the presentation and comprehension of the factors concerned in childbirth.

RECONSTRUCTION OF THE UTERUS

By Charles R. Robins, M.D.
Richmond, Va.

The desirability of preserving the generative organs in women during their functionating period, particularly in young unmarried women, admits of no argument. The difficulties which beset conservatism, however, when the uterus is the seat of a growth of which fibroid tumors are the predominating type, are very great and often insurmountable. Fibroid tumors in the body of the uterus are almost invariably multiple and the distortion and deformity are so great that conservatism in the large majority of cases is out of the question. In addition, knowing that fibroids are multiple and that they grow from very small islets, the presence of palpable tumors simply indicates that others are probably present which cannot be felt, and that, although the recognized tumors may be removed, others will probably develop. However, the anatomy of the uterus is particularly favorable for resection. The blood supply and the tubes entering from the sides enable us to remove whatever of the middle portion of the uterus may be desired or deemed advisable. The only things necessary are the blood supply, tubes and a continuous uterine cavity. Not all cases, however, are suitable for conservative treatment, and, where the deformity is very great or the fibroids generally distributed, a conservative operation is most often impossible. Neither is the operation indicated in all cases, even when the anatomical problems may appear to be

suitable. In women who have born children and who are approaching the menopause and in whom sexual life has been satisfied, removal is undoubtedly the best operation. It is safe, the results are excellent and there remains no reason for further operation as far as the uterus is concerned. The advantages of conservatism are overborne by the prospect of further pathology.

There remains, however, a class of cases in which the opportunity for matrimony or of bearing children is a matter of such great importance that some risk is justifiable. There also remains a class of cases in which the exact pathology remains a matter of doubt, notwithstanding that every effort has been made to arrive at a diagnosis. In such cases, as has been pointed out by Deaver in a most admirable paper entitled "Anterior Transperitoneal Hysterotomy," the exact condition can be definitely determined by incising the uterus through the abdominal route and directly inspecting the interior. By this apparently radical procedure it is possible in a number of cases to practice the greatest conservatism and if necessary to resect the uterus.

The operation which is contemplated in this paper is the bold resection of the diseased or tumor-bearing portion of the uterus and reconstructing the uterus by uniting the lateral portions that are left. It has many advantages over myomectomy, which is the operation with which it would most frequently be contrasted. In the first place it would save a considerable amount of time. It is far easier to resect the uterus than it is to attempt to shell out the tumors, particularly if they are numerous. It would have the advantage of enabling us to inspect the uterus, both from within and from without. In that way we would be most likely to remove all of the fibroid nodules. It is much easier to secure a normally shaped uterus where the incisions are carried along lines that will secure the best apposition. It must undoubtedly be a safer operation because we do not have the numerous pockets to obliterate and consequently there

would be no dead spaces and areas for infection. The operation is a safe one, because when completed there remains only a suture line which is hardly likely to give any trouble. The dangers of future rupture of the uterus, should pregnancy occur, I believe, are negligible.

I wish to report two cases in which this operation has been performed.

Case I.—Register No. 18389. This patient was seen June 6, 1913, and at that time presented the following history: Age, thirty-six years, white, female, single. This patient was contemplating matrimony. She had suffered all her life with nausea and had had pain all through the lower abdomen, and at times become very sore in the suprapubic region. In the last eighteen months her flow had been irregular and for the last two or three months had a tendency to check. She also suffered from sick stomach and indigestion. On examination she was found to be tender in the right iliac region and the uterus was markedly retrodisplaced and somewhat enlarged. At operation she was found to have a chronic appendicitis, which doubtless accounted for some of her symptoms, and in addition to the retrodisplacement of the uterus the fundus contained a fibroid together with a fibrosis which caused a marked thickening and hardening of the fundus of the uterus. In view of the fact that the patient was contemplating matrimony and on account of her earnestly expressed wish not to have any of her organs removed, it was determined to resect the affected portion of the uterus instead of performing a hysterectomy. This was further indicated because it was deemed advisable to clear up the pathology by securing the affected portion of the uterus for microscopic study. The resection was done by making a double V-incision extending down as far as the internal os anteriorly and posteriorly. The endometrium was found to be very much thickened and fungous. This was curetted through the incision. The lateral portions of the uterus that were left were sutured to each other with

interrupted sutures of Pagenstecher. The patient made an excellent recovery and was subsequently married and became pregnant. She, however, aborted at about four and a half months. A year later she became pregnant again but aborted at the end of one month. However, in July, 1918, five years after the operation she was delivered of a robust full-term infant without any pathology either during the pregnancy or at time of birth.

Case II.—Register No. 22550. This patient was seen August 29, 1917. Age twenty-four years, white, female, single. She gave the following history: She sought relief on account of a flow of blood from the vagina. Her periods commenced at fourteen years and at first she had no trouble except a tendency to go over time and a very slight dysmenorrhea. Her periods had always been free and would last four or five days. About three or four years ago she began to suffer with indigestion and a year later was taken with an acute attack of pain in the right iliac region and vomiting. Previous to this she had had a good many spells which were similar and which she says usually came on with her periods. She was finally operated and the appendix removed about two years previous to the time she consulted me. About six hours after the operation her flow came on, which was at the usual time, and she suffered considerable pain in the lower abdomen. After leaving the hospital she suffered with more pain at the time of her periods and the flow increased. Eight months previous to consulting me she had had a continuous flow for about a month and had been taken to the hospital and curetted. This, however, did not afford any relief and she continued with an irregular flow, which at times was very profuse, and on entering the hospital she presented every appearance of a person suffering from a profound anemia. On examination her abdomen was negative. On bimanual examination the fundus of the uterus was found retrodisplaced, but no irregularities in the contour of the uterus could be detected. In view of the fact that the patient

had been curetted without relief, it was determined to perform a laparotomy and explore the uterus through an incision. When the uterus was brought up a fibroid nodule could be palpated in the anterior wall, which was evidently extending into the cavity of the uterus. The tumor was removed by making a free elliptical incision and a submucous fibroid nodule about the size of a walnut was removed. The endometrium was thickened and fungous and was thoroughly curetted through the incision. The opening was then closed with Pagenstecher sutures and the displacement corrected by performing the Webster-Baldy operation. This patient was entirely relieved of all of her symptoms and is now in excellent health. In a letter just received she says she has fattened, walks three miles a day and suffers practically no pain with periods. Resection offered the only satisfactory method of dealing with the case. In the first place the exact pathology would have had to be a matter of conjecture unless the uterus were examined by direct inspection and palpation, as the tumor presented on the interior of the uterus and its detection by bimanual examination was practically impossible, as the only sign elicited was a slight enlargement. But even though the diagnosis were easy, its removal by the genital route in a virgin would have been attended with the greatest difficulty and danger.

As to the indications for this operation, we approach it from two points of view. First is that of incision of the uterus to expose the cavity. This presents a comparatively wide field of usefulness. We have to admit that even after making the most painstaking examination we are not infrequently in doubt as to the exact pathology. In a case of doubt it is a very easy and safe procedure to incise the uterus and inspect and palpate the cavity directly. and this is certainly indicated where the alternative proposition would be the removal of the uterus and the subsequent study of the pathology. These points and others are clearly brought

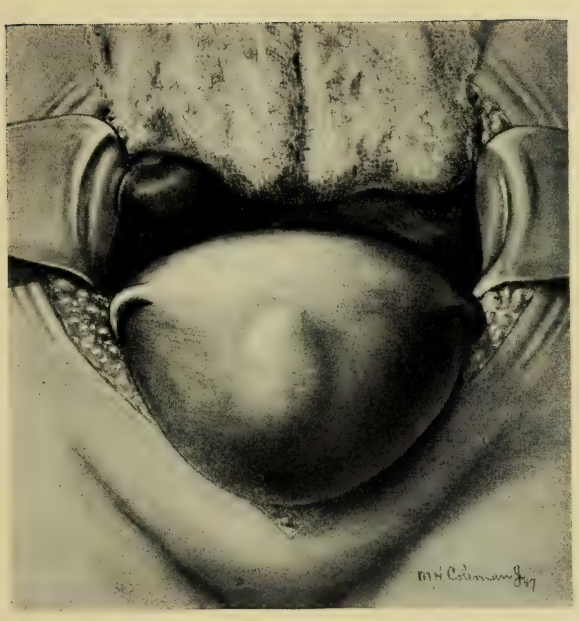


Fig. 1.—Case 2. Showing enlargement of uterus and elevation of fibroid. The fibroid is somewhat accentuated in this drawing as it really did not appear above the surface.

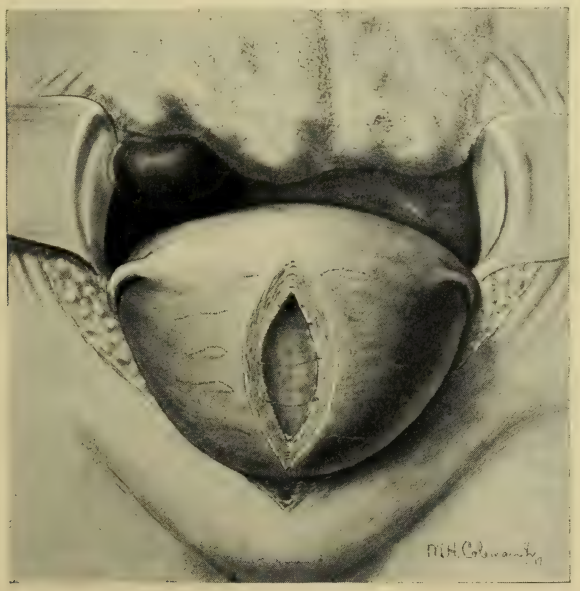


Fig. 2.—Case 2. Showing tumor removed by elliptical incision and sutures for approximation introduced.

out in Deaver's paper on "Anterior Transperitoneal Hysterotomy," already referred to.

In reference to the second point, the resection and reconstruction of the uterus, we have to admit that its application is necessarily limited. However, in certain conditions it would appear to be clearly indicated in preference to removal of submucous fibroids that are still within the cavity of the uterus and also in preference to myomectomies, provided the tumors lie in such a way that they can all be removed by resection. In young unmarried women and in married women who have not had children, we would be justified in resorting to this operation in preference to hysterectomy, even though it entail the risk of another operation on account of fibroids that may develop. Every case has, of course, to be judged on its merits, and perhaps not many will arise in which we can practice this method. Certainly I have not found it so easy in my own hands. But by study of the anatomy and pathology with the uterus in the hand and under the eye it is possible on some cases to secure very gratifying results.

Reference

Deaver, John B.: Anterior Transperitoneal Hysterotomy, Surg., Gynec. and Obst., xxii, 424.

DISCUSSION

Dr. Charles L. Bonifield, Cincinnati, Ohio.—I should like to speak briefly of an alternative procedure to opening the uterus in a case of submucous fibroid. We all know that in these cases the tumor ultimately will usually extrude itself into the vagina. Some years ago I was asked by Dr. Slater, of Erlanger, Kentucky, to come to Stringtown-on-the-Pike and remove a uterine polyp. When I got there the polyp could not be felt; it was not then showing itself in the cervix, although Dr. Slater assured me he had felt this tumor, and as he was a

man of excellent judgment I took his word for it. I told him that as the woman was menstruating at the time the cervix was dilated and softened, and after the menstrual period was over the tumor had receded into the cavity. I told him that he could send for me when the tumor again showed itself, which would be in two or three weeks, and I would come and remove it. We followed that procedure and in a little while the tumor was extruded, and all we had to do was to cut it off. I do not say that this can be done in all these cases of submucous fibroid, but their tendency is first to become intra-uterine and finally intravaginal.

ULTIMATE RESULTS IN ONE HUNDRED CASES OF PROLAPSUS UTERI

By John G. Clark, M.D.
and
Charles C. Norris, M.D.
Philadelphia, Pennsylvania

Within the last few years many different operations for the cure of prolapsus uteri have been suggested, and the ultimate results have varied considerably in the reports of several writers. Because the results of our efforts of eight or ten years ago were not so satisfactory as we desired, we revised our operative technic, modifying from time to time some points and reversing others, hoping thus to overcome the error in our earlier series of cases. This evolution in the treatment of these cases has been followed by a decided improvement, which we attribute to these changes. Formerly our efforts were directed toward correcting a lacerated perineum, a relaxed pelvic floor or a uterus in varying degrees of descensus: now we treat these cases as varying degrees of hernia.

All forms of prolapse of the uterus, vagina, bladder and rectum are but varying stages or phases of a hernial problem. There is no operation that will invariably be adapted to all cases, and there is no policy, therefore, that so jeopardizes uniform success as an adherence to a one-pattern plan of operation. So long as the operations of Emmet, Hegar and Tait were accepted as fixed and unvarying standards,

there was a wide range between an ideal functional restoration and a relatively large proportion of disappointing results.

In our earlier surgical treatment of prolapsus cases we advocated the Emmet principle in perineal operations, in conjunction with an oval anterior colporrhaphy, which was followed in turn by a suspension operation—usually the method of Kelly in younger women, and fixation of the uterus to the anterior abdominal wall in older women. This plan of treatment yielded satisfactory results in many cases, but the percentage of recurrences was sufficiently large to render a complete revision of our methods of operation necessary in order to assure a larger and better surgical output. This phase of our work is now regarded by us as a valuable transitory experience that has carried us forward into a much more secure surgical field, in which the final results are more uniformly satisfactory. The Emmet perineal operation has been abandoned, and we have substituted in its place a modification of the old Hegar operation.

For our inventory of ultimate results we have chosen 100 consecutive cases, which have been checked up either by personal interview and examination or by letters to patients and their home physicians. No case has been included in which less than a year has elapsed since the operation.

Before considering our present plan of treatment we must say a word as to our evolution from former to present standards of procedure. For several years we not only practised the Emmet perineal operation, but taught that this was the last word in plastic surgery as applied to the posterior vaginal wall. When, however, we carefully reviewed our more remote postoperative results, we discovered that in this we were in error, for although this operation proved successful in a large percentage of cases of simple rectocele, in those of more extensive type and in prolapse of the uterus the method was ill adapted to meet the conditions that caused the prolapse. Its greatest defect lies in the fact that the crest of the rectocele and the hernia in the higher reaches of the

vagina are not corrected. Similarly, any type of suspension operation that attaches the uterus to the anterior abdominal wall is also based upon a fallacious principle.

A prolapsus is a hernia of the uterus, in which Douglas's cul-de-sac is a chief propagating factor. Merely, therefore, to repair the external exit of this hernia—the vaginal outlet—by a plastic operation and to suspend the offending organ leaves the chief intermediary part of the hernial tract, Douglas's cul-de-sac and the upper portion of the vagina, still untouched. Under this plan, therefore, recurrences will be too frequent.

To Moschcowitz and Frank, of New York, we are especially indebted for calling our attention to the tremendous hernial possibilities of Douglas's cul-de-sac. Indeed, we are in full accord with Moschcowitz's belief that this pocket is a potent cause in the propagation of a prolapse of the rectum and it is the ultimate factor in the production of a complete procidentia uteri after the initial descensus of the uterus occurs. With the uterus descending in mid-position or retroflexion the intra-abdominal impact is directed into Douglas's cul-de-sac, after which the hernial sac is thrust downward, driving a wedge between the rectum and the vagina. Complete prolapsus is then a matter of relatively a short time. It becomes quite obvious, therefore, that to restore these cases successfully to normal health the hernia interposed between the rectum and the upper part of the vagina must be obliterated.

For analytic purposes the cases of genital prolapse may be grouped as follows:

A. Pseudoprolapsus uteri, in which there is a hypertrophically elongated cervix projecting from the vaginal outlet, with or without an accompanying cystocele or rectocele, the body of the uterus nevertheless occupying essentially its normal position in the pelvis. In each of these cases the anatomic variations are much less extensive than in a partial or complete prolapse, and the surgical principles of treatment

are, therefore, simpler and the final results uniformly satisfactory.

B. Partial prolapsus uteri, in which the cervix appears at the vaginal outlet, and is associated with a cystocele and rectocele alone or in combination. In this class we are usually dealing with three herniæ, involving the rectum, the bladder, and Douglas's cul-de-sac, the uterus appearing as a projecting mass.

C. Complete prolapsus uteri, in which the uterus is enclosed in a hernial sac, Douglas's cul-de-sac, completely outside of the vaginal outlet, associated with a more or less extensive cystocele and rectocele (vesical and rectal herniæ).

In Group A, pseudoprolapsus uteri, it is obvious that amputation of the cervix and efficient repair of the cystocele and rectocele will effect a perfect result. In Group B, partial prolapsus, the same procedure may effect a cure. It is especially in this class of cases—in women who have passed the childbearing period—that we perform a type of Watkins's operation before undertaking the perineal operation. In younger women, after completing the perineal operation, instead of inverting the uterus underneath the bladder, we usually open the abdomen and shorten the round ligaments according to the Coffey plan. In our earlier cases we considered this procedure sufficient to accomplish the purpose, but in an occasional instance the functional result was not satisfactory because we neglected to shorten the uterosacral ligaments—in other words, we failed to overcome this hernial tendency in Douglas's cul-de-sac. With our revised methods, in all those cases in which there is a decided descensus of the uterus, we shorten the uterosacral ligaments by plication on the posterior surface of the uterus at the cervicofundal juncture, according to Bovée's plan, thus restoring the suspensory function of this set of ligaments. In rarer cases, if Douglas's cul-de-sac tends to form a considerable hernial pocket, this also is obliterated by plication with catgut sutures, as suggested by Moschcowitz, after

which the round ligaments are shortened according to the Coffey plan.

In a few cases we have performed the Baldy-Webster operation, but because of its frequent failure to give symptomatic relief, we have long since abandoned the method, for while the uterus may be restored to a normal position, the patient often complains of a dragging sensation in the pelvis. We attribute the failure to obtain relief to the fact that either through direct tension or through possible adhesions forming at the site where the ligament perforates the broad liagment direct pressure is made upon the uteroövarian circulation, thus giving rise to congestive disturbances. In an analogous manner, a boy on crutches may be suspended clear of the ground, but his arms will suffer as a result of pressure on the axillary vessels. The Coffey plan of shortening the round ligaments, on the other hand, has been uniformly satisfactory.

In the C group, in women beyond middle life, we usually perform first a vaginal hysterectomy and then pull the broad ligaments well down into tension and after they are stitched together they are anchored in the vaginal vault in such a way that when released they spring back into the pelvis, pulling up the vaginal fornix and holding it in secure suspension. Before doing this, however, frequently we take advantage of the opening in Douglas's cul-de-sac to obliterate the deeper part of this space by plaiting it together with running catgut sutures. This effectively blocks a large hernial impulse, which otherwise predisposes to a postoperative prolapsus of the vaginal fornix and an ultimate eversion of the vagina. Since adopting this method or procedure we have seldom found it necessary to perform a celiotomy in these cases. In 3 cases in 100 in which Douglas's cul-de-sac was very greatly pouched and situated well outside of the vaginal orifice we followed the plan of Moschcowitz: the patient was placed in an exaggerated Trendelenburg posture, and the uterus drawn high up into the celiotomy incision, thus making it possible by placing successive layers of catgut

stitches to obliterate Douglas's cul-de-sac, after which a partial hysterectomy was performed and the round ligaments were then securely implanted in the cervical stump. In some cases a panhysterectomy may be necessary, in which case the round ligaments were implanted in the vaginal closure. In obliterating Douglas's cul-de-sac, Moschcowitz has warned against the dangers of including the ureters in the stitches; for this reason they should be located by touch or sight and carefully shielded from hazard during the peritoneal plication. Fortunately the necessity for this rather extensive and slightly more hazardous operation is seldom necessary as the foregoing plans are adapted to at least 98 per cent. of even the exaggerated cases.

In the surgical treatment of a simple rectocele or cystocele, no operation which does not go deeper than the skin coverings of these sacs will succeed. For this reason a simple oval denudation and suture in any type of cystocele will almost invariably fail. In a cystocele we deal with three factors: (1) the bladder as the hernial sac; (2) the subvesical fascial webbing, and (3) the vaginal musculature and skin. While the bladder can neither be excised nor deeply plicated, the interposed fascia between it and the vaginal wall may easily be dissected free from the vaginal skin and utilized as a suspensory medium. Through this agency the bladder is lifted well up, and under cystoscopy the mucous membrane is seen to be thrown into redundant folds, which, however, are quickly smoothed out by Nature during the healing process.

In the surgical correction of a cystocele we find that the lines followed in several other clinics are similar to those which we have adopted. In this as in many other fields of surgical endeavor the logical deduction drawn from the errors of our work has centered upon the chief causes of defects and through their correction the most effective plans for permanent cure have been established.

Thus of late we find many gynecologists laying particular

stress upon the necessity of restoring the subvesical fascial support in order to repair permanently the cystocele. In other words, the surgical adage, "no break in fascial supports, no hernia," is fully verified in the protrusion of the posterior and anterior vaginal walls. For this very reason, the flap splitting type of perineal operation, or a simple oval colporrhaphy, will frequently fail in the more pronounced cases of vesical or rectal hernia because in neither case is the main cause of those defects corrected. In an extensive rectocele the operation must be carried high up into the vagina in order to suture properly together the broken interposing fascia between the rectum and vagina. The simple perineal part of these operations is merely the concluding step of an hernial operation, in which the external outlet, like that of the external ring of an inguinal hernia, is restored to normal. In the posterior operation, the modification of the Hegar type as evolved in our clinic, effectually carries the repair if necessary quite up to the cervix, permitting the operator to reach the interposing cul-de-sac and suturing it in such a way as effectively to preclude its further participation in the vaginal hernia, or rectocele. In two steps of the operation, we are under obligation to our associates, B. M. Anspach and F. E. Keene, for their suggestions; to the first, for the use of a subcutaneous stitch in the final steps of the perineal operation; to the second, for suggesting that all of the stitches be inserted from the vaginal surface, thus doing away with the usual crown stitches, which appear on the perineal surface. These additions to our technic have added to the success of the operation and greatly to the comfort of the patient. The gradual approach to well-established principles in plastic operations in our clinic is, therefore, the cumulative result of associated staff endeavor. There is little of originality in this work, for as noted above, in many clinics we find the same principle in vogue, with merely variations in operative technic.

Analysis of Symptoms. While gynecologists may have pointed the way to the surgery of the upper abdomen, the latter in its achievements has demonstrated the errors of so-called gastric reflexes emanating from pelvic sources. Acute or chronic symptoms in the upper abdomen are rarely if ever of reflex origin. If we required any convincing proof of this statement, a review of symptomatology in our 84 cases will furnish cogent evidence against this fallacy. In this entire number, there were only 6 that complained of indigestion, and of this number 3 had gall-stones removed during the course of the operation for prolapsus. The chief symptoms were directly attributable to the pelvic disability. The one paramount fact which is self-evident is that gastric disturbances and general nervousness are the least frequent of all of the patient's complaints. In the order of frequency, the symptomatology is recorded as follows in 84 cases:

Presence of mass	70
Pain in the lower abdomen	28
Leucorrhea	27
Backache	21
Frequency or incontinence of urination	27
Dysuria	22
Pain on urination	18
Headache	6
Menorrhagia or metrorrhagia	15
General lassitude	7
Pain on defecation	1
Nausea	2
Indigestion	6
Nervousness	5
Dysmenorrhea	2

In conjunction with the prolapsus uteri, the following associated pathological conditions were noted, which unquestionably participated to a more or less extent in this symptom-complex:

Cholelithiasis	5
Appendicitis or peri-appendicitis	5
Myoma uteri	6
Hemorrhoids	7
Complete laceration	4
Prolapse of rectum	2
Hernia	5
Pelvic inflammatory disease	1
Vesical calculus	1

A preconceived opinion as to recurrences has not been sustained by our review of cases. We believed when we started this investigation that our percentage of recurrences or imperfect results would fall within the years after the menopause, first and naturally because the larger number of cases fall within those years. In our series of cases, 66 per cent. were forty-five years or over, and the decade between fifty-five and sixty-five years of age furnished 34 per cent. of our cases. Based upon this fact we expected to find our unfavorable results falling within these later years, but such is not the case, as our few failures bear no relationship to the age of the patient. One very evident statistical fact is all too obvious and that is, these patients usually have gone entirely too long without surgical help. Only 7 cases have come to operation within one year after the appearance of the prolapsus. In 37 other cases the interval between the appearance of the prolapsus and the operation has been between four and twenty-five years. In a few cases they had not previously consulted a physician, but the great majority have either been advised to let matters alone by the family doctor, or have been tided along with some form of pessary. Too often that ugly fallacy encompassed within the statement, "Wait for your menopause and you will get well," is dealt out to those patients. While the results of these operations, contrary to our preconception have turned out as well after as before the menopause, certainly with the progressive increase in the size of the prolapsus, the extent

of the operation is much greater, and, to say the least, post-operative morbidity is proportionately higher.

For the correction of associated pathological conditions the following operations have been performed: appendectomy, 17; cholecystectomy, 3; hemorrhoidectomy, 8; herniorrhaphy, 5; salpingectomy, 10; removal of cervical polyp, 1; myomectomy, 2; Webster's operation for diastasis recti, 2. In this entire series there has been no death.

Type of Operations. Because of the many factors entering into the etiology of these herniæ, it is obvious that no one type of operation is applicable to all cases. Many anatomical variations require a special surgical adaptation of measures to each case. Upon a careful individual study of each patient success depends. In the series of cases utilized for this study the following operations were employed:

Clark's modification of Hegar's operation, 79; Emmet's operation, 3; anterior colporrhaphy, 65; dilatation and curettage, 50; trachelectomy, 50; trachelorrhaphy, 8; Coffey suspension of the uterus, 12; ventral suspension of the uterus, 3; Baldy-Webster suspension of the uterus, 3; ventral fixation of the uterus, 7; Watkins's interposition, 30; vaginal hysterectomy, 15; supravaginal hysterectomy, 8; operation for complete laceration, 5; partial vaginal hysterectomy, 2; plication of uterosacral ligaments and peritoneum of Douglas's cul-de-sac combined with some other suspension operation, 3; excision of prolapsed vaginal stump, 2; fixation of cervical stump to lower angle of abdominal wound, 2.

An analysis of the above list shows that either the fundus or the entire uterus was removed in 21 cases; vaginal hysterectomies, 14; supravaginal hysterectomies, 17. Some variety of intra-abdominal suspension of the uterus was performed in 23 cases, Coffey suspension in 11, ventral suspension in 3, ventral fixation in 6, Baldy-Webster suspension in 3.

Thus the uterus was either removed or suspended in 44 cases and Watkins's operation was performed 28 times.

The larger number of hysterectomies have been performed during the latter period of our series. Since we have adopted the plan of utilizing the ligamentary attachments of the uterus for the support of the vaginal fornix, perineorrhaphies were performed on all cases, all but 3 being Clark's modification of the Hegar operation. Anterior colporrhaphies were performed 55 times, as a matter of fact anterior wall operations were probably performed somewhat more frequently than this, but were not noted on the operation blank.

In nearly all supravaginal hysterectomies the stump has been suspended by fixing the round ligaments into the cupped-out cervical stump. In some cases, in addition to this, either the ends of the infundibulo pelvic ligaments or in cases in which the adnexa were conserved the proximal tubal ends and part of the broad ligament have been included in the cervical stump. In only two cases the cervical stump (after an abdominal hysterectomy) has been fixed to the abdominal wall. This statement is confirmatory of our belief that this procedure is to be avoided except in very rare instances.

The results of our questionnaire and examination of cases of this series show that while the anatomical results were, on the whole, good the symptomatic results were even better. In our series of cases there has been no mortality and the morbidity has been slight. It has been our experience that practically all cases in which plastic operations are performed on the anterior vaginal wall require catheterization. In some this condition lasts for one day only while others are unable to void for two, or even more days. When catheterization has to be resorted to for more than 24 hours the routine administration of urotropin has usually been resorted to as a prophylactic measure against cystitis. When possible it is advisable to have these patients practice urination while in the recumbent posture prior to operation. In all cases we employ catgut sutures. In two or three cases there has been postoperative bleeding probably due to

premature absorption of the suture material, which has been controlled easily by vaginal tampon. We have also had four or five cases of infection. This is especially likely to occur in extensive anterior wall operations unless particular attention is paid to hemostasis.

Notwithstanding an occasional focal infection in no case has it been sufficient to necessitate a secondary operation and its influence upon our final results has been almost negative. For a short time we used a continuous buried suture, but this has the disadvantage, if an infection occurs, of a more extensive impairment of the wound than when the interrupted sutures are employed. In the first instance the suppuration is confined to the deeper tissue, in the latter it more quickly finds an exit.

Summary of Answers to the Following Questionnaire: 1. Have you been benefited by your operation? Cured, 70; greatly improved, 7; improved, 5; not improved, 2; worse, 0. One patient has been completely cured of prolapsus but has had a very serious "nervous collapse," which has made her an invalid. Three patients answered "improved" but from the remainder of the answers in the questionnaire they are apparently cured.

2. Have you had any frequency or pain on passing water? Yes, 5; yes, slight, 6; no, 68.

(*a*) If so, how often do you have to pass water during the day? 6 patients, 8 to 12 times.

(*b*) If so, how often during the night? 9 patients, 2 to 5 times.

(*c*) How soon did it appear after operation? Immediately, 8; one year after, 2; "soon" after, 10.

(*d*) When did it disappear? Still present in 9 cases. Present for one year, 1.

3. Have you been able to control the bladder since operation? Yes, 78; no, 4.

(*a*) If not, when did this symptom appear? Immediately, 3.

(*b*) When did it disappear? 3 or 4 months, 1; still present, 2.

4. Has there been any falling of the womb since operation? Yes, slight, 8; no, 76.

(*a*) If so, is it as large as before operation? Yes, 1; no, 7.

5. Has there been any undue (abnormal) bleeding from the vagina since operation? Yes, 0; no, 82.

6. No patient has had a second operation since leaving the University Hospital.

7. Have you had any pain or discomfort in the operative region? Yes, 3; slight, 7; no, 74.

(*a*) If so, how soon after operation did it appear? Immediately, 3. (Only 3 patients answered this question.)

(*b*) Is it now better, worse, or has it disappeared? Better, 3; same, 1.

(*c*) Describe the pain. Soreness in lower abdomen, 2; pain in vagina, 1. (Only 2 patients answered this question.)

8. Is your general health better than before operation? Yes, 77.

(*a*) How was your health before operation? Good, 8; fair, 22; poor, 47.

One patient operated upon five years ago according to husband's statement cured, but died two years ago from goiter. Another patient was reported by her physician as cured but died two years after her operation from hyperthyroidism and auricular fibrillation. One patient was pregnant at the time of the receipt of the questionnaire. Another one has had two children since operation. She reported that she was cured and there had been no recurrence.

Of the 100 cases selected for study, we failed to trace 14.

Conclusions. 1. Cases of prolapsus uteri should be treated upon a hernial basis in which Douglas's cul-de-sac, the rectum, and the bladder participate as protruding sacs into a weakened vaginal canal, the vault of which becomes a primary point of weakness. It is easily explainable, therefore, that a simple perineal operation with an associated

suspension of the uterus, or with a hysterectomy, will frequently fail because the essential weakness in the upper part of the vaginal canal, both anteriorly and posteriorly, is overlooked, and the correction of the primary hernia in Douglas's cul-de-sac is not, therefore, effected.

2. To overcome the surgical defects of previous years the broken or weakened fascial layer and muscles making up the septum between the vagina and rectum, are now corrected by extending the perineal operation high up into the vagina even to the cervix.

3. Suspension or fixation operations as applied to the uterus will frequently fail because the hernial pocketing in Douglas's cul-de-sac is not corrected, and the continuous drag in this area leaves the patient still uncomfortable, or may lead to a recurrence of the prolapsus.

4. In complete prolapsus of older women a vaginal hysterectomy, with the utilization of the broad ligaments, attached to the upper vaginal extremity or a supravaginal hysterectomy, with these ligaments applied as inserts into the cervical stump, with plication of the dependent Douglas's cul-de-sac, is most efficient.

5. In younger women, within the childbearing period of life, the utilization of the uterosacral ligament plicated upon the posterior wall of the uterus at the cervicofundal junction, followed by some form of round ligamentary shortening, with us preferably the Coffey plan, is almost invariably successful.

6. The interposition operation (Watkins's) is the method of choice in women beyond the menopause when the cervix only descends to the vaginal outlet. Of late we find the interposition operation of less and less necessity if a trachelectomy is performed, followed by a careful anterior colporrhaphy. The effectiveness of the latter procedure depends upon the restoration of the weakened area between the lower third of the uterus and the vesical wall. Here the hernial tendency is very pronounced and if this area is not blocked a recurrence

is probable. In the correction of the cystocele, especial care must be observed in dissecting free the subvesical fascia and utilizing it as a suspensory sling for the support of the bladder. In all of this work the chief factor lies in the restoration of weakened or disrupted fascial supports.

DISCUSSION

Dr. J. Wesley Bovée, Washington, D. C.—I think we owe a debt of thanks to Dr. Clark for his admirable presentation of this subject. He has considered it from the standpoint of a hernia. The only proper way in my judgment is to view these marked prolapsus cases as hernias and, like all hernias, we should get to the ring of them to properly correct the deformity. It is very important, I think, that we get back of the fascia, that we shut off the enlarged cul-de-sac to a normal degree, and I have felt there was great necessity for holding the cervix back well toward the sacrum to lessen the size of the bottom of the cul-de-sac. Therefore, it is necessary to get perhaps a reconstruction of the uterosacral ligaments. Often we find them stretched out to the merest threads and a reconstruction has to be made, and that can be made only through the abdomen if the injury to the ligament is well back toward the sacrum, as it often is. If the injury is close to the uterus in the uterosacral ligament, it can be reached through the vaginal canal and can be met by an operation from below; otherwise the abdomen must be opened and the cervix secured well back to the sacrum, and many times it has been completely reconstructed. We must get a firm hold on the fascia over the upper part of the sacrum and fasten it to the cervix. That closes the hernial ring. With that, if we can sacrifice the uterus, we have for closing the hernia anterior an excellent operation which has been done by several surgeons for many years, but brought out by Dr. Charles Mayo—namely, the vaginal operation which did away with the uterus and sutured the broad ligaments together, bringing their tops well forward under the bladder. Dissecting back the vaginal mucosa these broad-ligament stumps are brought forward nearly to the urethra, really making a splendid floor to the peritoneal cavity.

As to the vaginal operation in a case of complete laceration of the perineum I believe we have no operation that can compare with that of J. Collins Warren, which was brought out later by Ristine and by Dr. Kelly, but done many years ago by Dr. Warren, namely, making a flap on the vaginal mucosa, bringing it down, throwing it into the sulcus of the tear in the recto-vaginal septum, which gives us an intact anterior rectal mucosa, and, therefore, a clean field for the rest of the operation; doing away with the danger of infection, practically bringing an apron upward over the perineum, when the perineum and the sphincter ani have been sutured. That is the best operation known for complete laceration of the perineum. I favor buried sutures. This work in the way of prolapse of the anterior vaginal wall is well demonstrated, and I think is superior to all other procedures, unless it be some cases that are extremely severe, in which an operation like the Sänger operation has to be done for elevating the bladder or the Le Fort operation. When we retain the uterus we should be very particular that we do not decrease the distance between the cervix and the pubic arch.

As to incontinence following this work, it is due to injury to the sphincter vesicæ muscle and the fascia probably attached to it, and this we will find many times is only controlled by going up under the pubic arch laterally, getting hold of the fascia well on both sides and suturing the urethra or the tissues just underneath it laterally, swinging it up on each side and drawing it up toward the pubic arch. I have not seen anyone else do this, but believe it is an essential feature of the procedure because it does aid control of the outflow of urine.

Dr. Charles R. Robins, Richmond, Va.—This is an interesting subject because it deals with a condition that is difficult to cure. There are two principal types of prolapse: in one of them the prolapse is dependent on injuries of the perineum; but in the other type the prolapse appears to me to be due to direct injuries during labor to the structures lying in relation to the anterior wall. Those of us who have done obstetrics have often seen women in labor with the anterior wall of the vagina being pushed down in front of the advancing head. As a result of this condition it would seem that all of the attachments of the bladder or all of the attachments on the anterior vaginal aspect are disturbed and are torn loose. In this particular type, where the bulging cystocele is such a conspicuous factor, the cure of the prolapse is quite a problem.

For some time I have made it a rule in examining patients who have prolapse to always examine them in the standing position and with a full bladder. I do not think we can get any sort of picture at all by putting the patient in the dorsal position and examining the parts with all pressure relieved. In other words, one needs to produce the condition in which the prolapse comes out and gives the patient trouble. In these cases we will find that after the bladder has begun to come down the hydrostatic pressure of the urine in the bladder causes a continual increase in the size of the cystocele. The difficulty in curing these cases is to find something to sew the parts to. Where the uterovesical fascia can be demonstrated easily I should think the operation Dr. Clark has advocated would be very satisfactory, but it seems to me, at any rate, that in some cases it is rather difficult to determine. My experience has been different from that of Dr. Clark, because I have found the interposition operation very satisfactory, and have gradually come to adopt it in all cases of exaggerated prolapse with cystocele. The cystocele in my experience gives the most trouble. In these cases also one will find that the cystocele has come down to such an extent that when the woman is in the standing position the bladder appears to be entirely released from its attachment to the cervix. This is a very important point in holding up the bladder, and in the cases in which I have done the operation approximating that which Dr. Clark has spoken of, I have always separated the bladder from the cervix and attached the vagina on the cervix high up, thus giving support to the bladder and preventing the reformation of the cystocele. I do not understand that the illustration showed this separation of the attachment of the vagina to cervix, but it is one of the very important anatomical factors. Without going into the other details of the paper, my own experience has been that the interposition operation, while it does not look anatomically good, yet, as a matter of fact, gives results superior to any other methods I have tried of dealing with prolapse.

Dr. Charles L. Bonifield, Cincinnati, Ohio.—I feel we are all indebted to Dr. Clark for his interesting and scientific paper on this subject as well as for the pictures that bring these cases of prolapsus so clearly to our minds. There are one or two points I want to bring up. I never did anything original in my life. For my plastic work I am indebted to four or five men: Dr. Kelly,

Dr. August Martin, of Berlin, my old teacher, Dr. Reamy, and the president of this Association, Dr. Stone. We approach things in different ways; there are no two of us who work exactly alike. There is one point in the paper I cannot quite get into my head; maybe it is stupidity on my part, but in making the dissection on the posterior vaginal wall to get up to the cervix, he cuts through the vaginal mucous membrane. I have never seen any necessity for that. After one has dissected the vaginal mucous membrane loose near the sphincter he can carry the dissection up as far as he wants with blunt gauze dissection and leave a flap, and can sew under that flap practically as well as he can sew through the slit, so that personally I cannot see the necessity for the removal of the vaginal mucous membrane, although the results are the same.

I quite agree with the essayist that the fascia on the posterior vaginal wall must be closed. I close that with buried sutures, and I find that plain catgut is better than chromic gut because the latter lasts too long in this tissue. I always build up the perineum as he does with his buried sutures and superficial sutures, although I have not used the subcuticular stitch in this particular neighborhood.

When it comes to the anterior vaginal wall I think our president (Dr. Stone) has devised the best operation for it. He cuts through the entire anterior vaginal wall from near the urethra clear to the cervix, then makes a transverse cut, separates the bladder from the cervix and from the vaginal fascia, lifts it up to whatever level he wishes, and attaches the fascia again to the uterus at a much higher level, and attaches the fascia all along down the anterior wall of the cervix, preventing the thing that Dr. Clark emphasized, namely, the danger of starting a new hernia where the fascia comes in contact with the cervix. Dr. Stone read a paper some years ago on this subject, and I hope he will say something about it today. Personally, I have never done this bringing the uterus down below the bladder; it may be all right, but unless I have a great many more failures in the future than I have had in the past I am not going to do anything that is so unanatomical and unphysiological. So long as I can get results from the method I now employ I am going to stick to it.

Dr. Clark has very beautifully and very truthfully called attention to the fact that the cul-de-sac is oftentimes the starting-point of this trouble, and we all know the depth of the cul-de-sac

varies very greatly in individuals. Everyone who has tried to give patients temporary relief by having them wear pessaries knows if they have a good deep cul-de-sac the pessary gives comfort, but if they have a shallow one the pessary cannot be worn with any comfort. The point I want to make is that when the anterior vaginal wall is attached to a higher level, as Dr. Stone has suggested, one pulls the fundus of the uterus forward, and if there is any tone in the uterus at all he throws the cervix backward. If in addition to that one does a Gilliam operation, to which I can see no objection except that the patients complain of a little drawing where the new attachments are made for a few weeks, and pull the uterus, not forward and downward, but forward and upward, one will to some extent eliminate the cul-de-sac without any further operation at that point.

The operation on the uterosacral ligaments is undoubtedly a valuable procedure when necessary, but I believe, in the majority of cases,if one does the vaginal work as has been described and the Gilliam operation it is unnecessary to do anything of that sort. The point Dr. Bovée brought out is most excellent, injury to the anterior vaginal wall. Those of us who have done obstetrics will recognize that this injury is oftentimes on one side of the urethra. This is not very evident until some years afterward, but unless something is done on either side of the urethra to fix up the fascia one will have a certain amount of prolapse of the urethra, a sagging of the urethra, after he had taken care of the cystocele. Therefore it is necessary to do a little operation, as Dr. Bovée has said, on either side of the urethra.

Dr. Howard A. Kelly, Baltimore, Md.—One can only touch the high spots of this important subject. I am personally indebted to Dr. Clark for the manner in which he has presented his paper, because I see the dawning of a better era, when our field of operations will be contracted down to a pretty well-defined technic of from one to several simple procedures. I think we can occasionally relieve prolapsed uteri with a pessary, especially in an old woman with a fair outlet. A disk pessary is best in such a case, and if the patient is careful when straining at stool to prevent its escape the uterus will not protrude again.

We want to avoid, as far as possible, abdominal operations. It is very upsetting for old women to have extensive vaginal operations done on them and an abdominal operation in addition. I think, too, that all of us want to get away, as far as

possible, from interposition operations. I have done many of them, and serious difficulties have been reported, so I only resort to one in the occasional case. Whenever we can do our work by reconstruction fascial operations, that is far better.

There are several points about the vaginal fascial operation I would like to emphasize. In the first place, the anterior wall. We all agree today that it is best to do an extensive fascial reconstruction along with the vaginal resection. That is a point which calls for a tribute to younger living men, for we have learned it within the last twenty years. We did not know anything about it in the days of Emmet and Sims, when we simply cut off an oval piece of the vaginal wall, taking no account of the fascia, the reconstruction of which makes all the difference between success and failure. Dr. Bandler taught me an important point, namely, that in the posterior operation we want to loosen and elevate the vaginal floor. Again, the use of the levatores ani is a note that was new not so long ago and is essential to success. Also, note that there is a fascia to be used here just as in dealing with the anterior wall, although often not so well defined.

Finally, I would like to call attention to several cases of a rare condition I have seen, one of them quite recently. Several years ago I operated on a patient who had been operated upon repeatedly before. The whole trouble was a huge rectocele. The difficulty was not, however, with a rectocele where the bowel itself enters the sac, but to that formed by the entrance of a large peritoneal pouch into the sac, which actually protruded out of the vaginal orifice at the vulva. If the small intestine enters such a pouch it is an enterocele easily recognized by the gurgling and displacement of the bowel, but in both of these cases there was no small intestine felt at any time. Now, unless the condition is recognized there is sure to be a recurrence after any operation whatever, however radical. I would suspect every big pouching rectocele with no rectum in it, and in operating would remove the whole thickness of the vagina and see the rectum behind it in order to be satisfied. The treatment is to extirpate the sac up to the cervix as far one can reach from below and sew it up with silk. In the last case the hernia was the size of my fist, with a big pouting sac, which had insisted on coming down after a thorough radical vaginal operation. I extirpated the whole thing, cut the peritoneum off above and behind the cervix and closed it with two purse-string silk sutures up behind

the uterus. In both the results were perfectly satisfactory after many failures.

Dr. Miles F. Porter, Fort Wayne, Ind.—After these sutures are put in you tie off the peritoneal sac?

Dr. Kelly.—Tie it off, then cut it away.

Dr. Porter (resuming).—Up to that extent the operation described by Dr. Clark is one along the same line as the ordinary hernia operation. Here you miss one of the keys to a successful hernia operation unless you do what Dr. Kelly did this last time. One of the key points in the successful operation is obliteration of the sac and not simply pushing it up. An inguinal hernia in which the sac is left will recur usually. Ordinarily in these operations for the repair of injury to the pelvic floor we can only do what Dr. Clark has described. We can pursue the hernia technic up to the sac and allow that to remain.

There are one or two points I would like to refer to particularly. Our failures in perineal work have very largely resulted from the fact that our stitches have gone through an infected area, namely, skin and mucosa, and on account of that infection our work has been a failure. Personally, for years, I have not been in the habit of putting through-and-through sutures in either perineorrhaphy or anterior colporrhaphy. It seems to me we would not have so many different changes in our technic in these operations if we analyzed each case and built up what has been torn down. There is no orthodox operation to my mind for every one of these cases. An operation that serves better than any other operation is the operation that repairs the damage that is present and causes the trouble. Sometimes that is one thing and sometimes it is another. The general principles, as advanced by Dr. Clark and Dr. Kelly, are all good, but the particular method of applying them will vary in detail considerably.

Dr. Clark in the first picture showed a mattress suture going through the mucosa.

Dr. Clark.—Yes; the sutures are catgut.

Dr. Porter.—If one allows this (indicating) to represent the first line of incision through the mucosa and this blue line

(indicating) represent the fascia I understand you introduce the mattress sutures only at one point, which illustrates the danger of a suture when it goes through the mucosa. I apply the mattress suture so that it includes these two layers and tie them together and then put in a submucous suture to cover it up. One can get a good hold on the fascia if he has it well exposed and there is no occasion for passing it through the mucosa. The mucosa is not firm. This is a stronger layer than if he had stitched together the fascia as in this line and the other is on top of it, so one has no stitches exposed to the surface at all, the idea being that the first suture picking up the fascia under the bladder does not pierce the mucosa. I do the same thing exactly as does Dr. Clark, except I think it is advisable to put all stitches under the mucosa entirely so that one has nothing in the way of a suture exposed to the air.

Dr. Ernst Jonas, St. Louis, Mo.—I believe the most important point in the operation for cystocele is the complete separation of the bladder from the cervix. I feel sure that if we do only this one thing; separate the bladder thoroughly from the cervix, we will already have done more than we could do with the average reconstruction operation for cystocele. If we then combine with this high and complete separation of the bladder from the cervix the thorough union of the vesicovaginal fascia, then, and then only, have we followed the principle of a hernia operation. We speak of a hernia operation but do not proceed as we do in operations for hernia. If we apply both these principles in this operation I believe we will have more successes and less failures.

Dr. John T. Moore, Houston, Texas.—At the risk of exposing my ignorance I would like to ask about this fascia that has constantly been referred to as lying between the vaginal mucous membrane and the bladder. I cannot get into my mind in any possible way just what is meant by that, because fascial structures are for holding or fixation purposes. Fascia is intended histologically to hold and not give, and if there were a fascial plane between the bladder and mucous membrane, I cannot understand how we could get a distensibility of the vagina when necessary to allow the passage of the child. There is a fibrous coat, but no fascial layer, so far as I know. I like the way the sutures are put in, but to get all interstitial tissue lying under-

neath the submucosa, I do not know what fascia is intended to be picked up in putting these sutures in first. If I could have an explanation of that, I would appreciate it. I have enjoyed the paper very much and the discussion.

Dr. I. S. Stone, Washington, D. C.—Instead of taking time to continue this discussion at length I should like to say that Dr. Bonifield has already mentioned what I was going to take up in this connection with Dr. Clark's very valuable paper, and Dr. Robins has also mentioned his technic, which corresponds with that followed by myself, in which the bladder is separated from the vaginal walls and the uterus pretty well up, and after excising the vaginal walls, attaching them to the anterior surface of the uterus. In my experience the bladder has never been known to come down again after following that method.

Dr. Clark (closing).—With reference to Dr. Bovée's remarks concerning the injury to the sphincter action of the bladder during childbirth as a cause of vesical incontinence, I am in full accord. In previous years when the various colporrhaphies and other methods suggested for the cure of incontinence were in vogue the results following such treatment were decidedly of the hit-or-miss character. Only since taking into full account the value of the subvesical fascia as a means of not only curing the cystocele but also of relieving the incontinence have the best results been obtained. Through the utilization of this fascia in the sphincter area can this defect be most satisfactorily restored with almost invariably a functional readjustment.

I was particularly interested in the point which Dr. Robins has brought out with regard to the weakness encountered in cases of prolapsus or extensive cystocele between the trigonal area and the cervical neck. This is a very important point, for not infrequently the breaking of the uterovesical ligamentary structures permits the bladder to slip downward and start as a primary hernia in this locality. Particular attention, therefore, should be paid to this very important point in the repair of these cases. We therefore carry dissection well up under the bladder to the point where the peritoneum is reflected from the bladder to the uterus, and in the final suturing of the subvesical fascia this area is very carefully blocked in order to prevent this ballooning tendency of the bladder through this weakened area. I believe that this breaking of the uterovesical attachment is a

much more potent cause of an exaggerated cystocele than even an extensively lacerated floor, for not infrequently one finds an extensive cystocele without much break in the pelvic floor. The traumatic injury, therefore, in childbirth is not infrequently expended chiefly in this direction and leads to this major disability later. Therefore, if one does not carry the dissection well up above the cervix and effectively overcome this weakened area recurrence is likely. The point, therefore, which is brought out and which perhaps I did not lay sufficient stress upon in my paper is an excellent one.

As to the interposition operation in prolapsus uteri, I occupy a midway position between that of Dr. Bonifield and Dr. Robins. Dr. Bonifield, I am sure, does not do this operation sufficiently often, and possibly Dr. Robins employs it too frequently. I speak of this from the evolution of our own experience, for we are doing fewer of these interposition operations now than formerly, not because the operation has been found wanting, but because we believe we can frequently secure as satisfactory results without the necessity of opening the peritoneal cavity and bringing the uterus forward under the bladder. It still occupies a very important place in our list of expedients for the cure of prolapsus. Especially is it of value in a woman past the menopause in whom the cervix does not descend below the vaginal outlet, but if it passes beyond this point and the uterosacral ligaments are decidedly overdrawn I consider it most unwise to do an interposition operation. Upon this point Dr. Watkins himself has laid special stress. Dr. Bonifield speaks of being able to carry out effective plastic work upon the perineum without removing any tissue. It is the flap-splitting operation to which I particularly object, for I am confident that without an extensive and unnecessary dissection it is not possible to reach the upper portion of the vagina where many of the rectoceles begin without at least lifting off the skin covering in the upper part of the vagina. I have seen in the hands of skilled operators both types of operations performed, and to my mind there is no comparison between the two methods, not only in the primary but in the ultimate plastic result. In the flap-splitting type of operation there is considerable redundant tissue left, which not only lessens the primary effect but also tends to vitiate the ultimate result of the operation. I can see no possible objection to the removal of this redundant tissue, and in the operation which we have performed an oval denudation carried well up to

the cervix makes it possible effectively to take up the redundant fascia as well as muscular structure beneath the vaginal floor. Therefore, in the light of our experience I cannot agree with Dr. Bonifield in his belief that the type of operation which he performs will give as good results.

I am particularly impressed with what Dr. Kelly says relative to discarding all suspension types of operation. Upon this point we have especially laid stress in recent years, based upon the experience of failures in the past. The extensive rectocele which Dr. Kelly has described is unquestionably a hernia of Douglas's cul-de-sac, and therefore must be treated as any other extensive hernia. It is quite possible in these exaggerated cases to dissect out the sac and to close it, as Dr. Kelly has said, with the very best final results. The occasional case will require the actual excision of the sac, but I do not agree with Dr. Porter when he insists that we must invariably remove this sac, for I believe it is unnecessary. We run the risk of doing injury to the rectum by an attempt to dissect out such a sac. Therefore, it is only in the occasional case, such as Dr. Kelly describes, that I believe so extensive an operation is justifiable. It not only may be attended by injury to the rectum, but is always more likely to be associated with considerable hemorrhage. Dr. Porter advocates the use of a continuous buried stitch in plastic operations in the vagina on the ground of a better aseptic and antiseptic technic. We have tried both plans and very definitely favor the interrupted stitch. The insertion of the sutures from the vaginal surface is attended with comparatively little septic risk, because the vaginal secretions are germicidal and this tract is almost germ-free when it comes to the pathological varieties of bacteria. It is a well-known fact that perineal operations very seldom suppurate, and I believe the immunity is attributable to the germicidal action of the vaginal secretions as well as to the immunization of this area to a colon bacillus infection. With the continuous buried stitch, if trouble arises, the infection does not find its way to the surface, but the suppurative process may extensively dissect in all directions under this sealed area, thus completely destroying the effects of the operation and making it extremely difficult subsequently to restore these tissues by any operation. If, on the other hand, interrupted stitches are employed, in the event of an infection occurring, it will quickly find its way to the surface and only cause injury to a small localized area. In one of our recurrences, in which we had

employed the continuous stitch before the abscess was finally evacuated, an extensive undermining of the bladder had taken place and the patient had a slow and a very tedious convalescence. It was this particular case which caused us to abandon the buried stitch in the vagina and to return to the use of the interrupted method except on the perineal surface, which has almost invariably proved satisfactory. In our series of 100 cases the percentage of suppuration has been so small as to be almost negligible and has caused so little subsequent injury as scarcely to vitiate in a small degree the final results.

Dr. Moore is puzzled as to his anatomical landmarks in locating the subvesical fascia. It can be located with the greatest ease by a sharply cut incision beneath the bladder, carried down until the muscular layer of the bladder appears. It clings rather closely to the vaginal wall, but may very satisfactorily be dissected loose, and when this detachment is started it may be pushed back with the greatest ease by either dissection or the use of the finger covered with a gauze mop.

In closing, I wish particularly to lay stress upon the excellent work which our President, Dr. Stone, has done in this particular field. He has pointed out with great clearness the necessity for careful fascial dissection and suture in the cure of cystoceles, and I am sorry that the time occupied by this discussion has not given him an opportunity to bring before us the points which he has so accurately defined.

GYNECOLOGICAL PELVIC DRAINAGE: ITS INDICATIONS, METHODS AND MATERIALS

By J. Wesley Bovée, M.D.
Washington, D. C.

The subject of employment of drainage in intraperitoneal pelvic surgery has provoked many heated discussions, dating back as much as forty years. I shall not take up the relative value of capillary drainage (said to have first been used by Heister in the eighteenth century, according to Bryant and Buck[1]) and tube drainage, though that subject is not without interest. The glass tube drain through the abdominal wound was employed in practically all operations, not excepting those conditions constituting what are now called clean ones. But when one reviews the technic of intraperitoneal operations of forty years ago, it is not difficult to understand that the surgeon dreaded to completely close the abdominal wound. Kelly's clinic in Johns Hopkins Hospital showed infection was introduced through the tube in the postoperative treatment and the use of the glass intraperitoneal drainage tube was gradually lessened. It was succeeded by the Mikulicz drain, and that by an effort to avoid drainage. The question of whether drainage should be employed, as the practice of cleanliness and careful technic became more universal, received marked attention. The trend of the times since has been to avoid drainage to the utmost degree

[1] American Practice of Surgery, i, 761.

possible. Greater confidence in the capacity of the peritoneum to care for its injuries has been established in our profession and some, notably, Robert T. Morris, of New York, announced their preference to leave within the peritoneum pus found there, because of its food value. I am prompted at this juncture to repeat my statement to the Medical Society of Virginia, in 1902,[1] that I believe the wise pelvic surgeon never drains in clean surgery, very rarely in dealing with the late results of infectious inflammations, and very frequently when dealing with such processes in an early stage. But aside from the dangers of peritonitis and other evils that may arise from infectious materials in the pelvic portion of the peritoneal cavity there is a very common and serious condition—peritoneal denudation, arising from the separation of pelvic adhesions in pelvic surgery. Ofttimes quite large areas of the pelvic peritoneum are denuded, and to cover them up with peritoneum is often found impossible. It is with special reference to this condition that I will consider this subject a little farther along.

I believe no one will gainsay that dependency is advantageous in drainage, as serum, pus and most fluids will tend to gravitate. Therefore, for drainage of the female pelvis the vaginal route is always preferable to the abdominal. Nor is gravitation the only point of advantage of the lower route. I have not in many years seen a woman's pelvis drained through the abdominal wall that I did not think she had been unfortunate in the selection of her surgeon.

For the employment of vaginal drainage from the peritoneal cavity, I believe we are indebted to E. R. Peaslee, who in February, 1855, after removing an ovarian tumor complicated by ascites, passed a gum elastic catheter per vaginam into Douglas's pouch, which was retained thirteen days.[2]

[1] Tr. Southern Surg. Assn., p. 199.
[2] Am. Jour. Obst., 1870–71, iii, 300–318.

Of the many materials used for pelvic drainage, cotton gauze and rubber are by far the most commonly employed —the rubber tube or gauze for small areas and a combination of them for larger areas. Many favor the cigarette drain of a layer of thin rubber enclosing sterile or medicated gauze or rolled with the gauze. A thin rubberized paper is often substituted for the rubber. Claim has been made that such materials have at times not acted as a drain, but in an opposite way, *i. e.*, plugged the opening into the vagina and caused an accumulation of fluid above them that found an exit through the abdominal wound, thus weakening or possibly infecting it. In 1912[1] I exhibited to the American Medical Association a rubber drain I had devised and employed for several years in pelvovaginal drainage. It consisted of a triangular piece of thin rubber, usually taken from a condemned rubber glove and attached by its narrow base to a soft rubber round rod about one-quarter of an inch in diameter and two and a half inches in length. This bar was made to rest on the uterosacral ligaments and the thin rubber, about four inches in length, protruded into the vagina. The lowest angle of it could be grasped with a forceps introduced through the vulva, and the whole of the drain easily and painlessly withdrawn. Ofttimes plain gauze was brought down behind it when extra covering of denuded peritoneal areas was desired. Until March, 1916, when I began the use of the paraffin-stearin gauze for this purpose, this rubber drain was used with a high degree of satisfaction, though at times its withdrawal was notably painful to the patient. Hart E. Fisher, Chief Surgeon of the Chicago Elevated Railroads, after a protracted and rather exhaustive study of various substances that could be employed on denuded wounds without adhering to the tissues, published his work in the *Journal of the American Medical Association* for March 25, 1916, lxvi, p.

[1] Jour. Am. Med. Assn., 1912, lix., 240–251.

939. He used plain surgical gauze, surgical cotton, chamois skin, gutta-percha tissue, silver foil, paraffin or oiled paper, rubber dam (dental), narrow mesh fine silver wire screen, medicated gauze dressing, cold cream and powder dressing. Careful detailed statements are made by him regarding the advantages and disadvantages of each of these agents; his studies covered a period of two years. He concluded that plain gauze soaked in equal parts of stearin and paraffin was perfect in its non-adhesive property and could be placed against the denuded tissue and covered with other (plain) gauze to absorb discharges coming through the special gauze, without adhesion of the dressing to the wound. In cases in which, in the course of several days, the plain gauze was several times changed without disturbing the paraffin-stearin gauze no adhesion occurred.

His method of preparation of this gauze is given as follows: Paraffin wax is brought to the boiling-point at three different intervals in the course of an hour and filtered through a narrowly meshed gauze. It is thus sterilized and freed from any foreign bodies like minute particles of grit, etc. During this procedure the stearin (stearic acid) is brought to the boiling-point and filtered by the same process and for the same number of times. Then equal parts of the liquid hot paraffin and liquid hot stearic acid are poured into a white porcelain container, again brought to the boiling-point and filtered as described above. The mixture is then ready for the sterile wide meshed gauze, cut in sizes to suit, which is immersed in it for ten minutes to allow the gauze to become thoroughly impregnated with the fluid. The wet gauze is then removed and stretched, and the excess of mixture allowed to drain off. A jet of filtered and heated air is directed against the gauze, causing the film of wax over the meshes to melt and allowing a more uniform waxed screen. When dried the gauze is placed in a sterile container and sealed. I have had this gauze made by this formula and again the feature of blow-

ing hot filtered air through has been omitted, thus avoiding a very troublesome feature and as well a possible danger of contamination. The product of the curtailed process was not as smooth; though, by breaking it slightly when applying it, no practical defect has been noticed. The pieces should be originally cut small, as often but small areas are to be covered and the difficulty in making this gauze would emphasize the necessity of greater economy in its application.

The Abbott Laboratories of Chicago and New York produce a material called parresined lace-meshed dressing that is stiffer and coarser meshed. I have used it for this purpose but found the meshes too large, yet it is a fair substitute for Fisher's paraffin-stearin gauze. After his paper appeared, for two and a half years I have been using Fisher's gauze for vaginal drainage from the pelvic peritoneum. It has largely been used as a casing of one or two layers surrounding plain gauze. I soon learned to suture the casing to the core of plain gauze, for in one patient the interne, Dr. Kane (a prisoner in a German camp for many months) removed eight inches of the twenty-four inches of gauze on each of the third, fourth and fifth postoperative days. To our surprise, in about three days later the patient expelled the twenty-four inches of the paraffin-stearin gauze. In a fair proportion of the work a roll of the latter gauze was used without the plain gauze core. The employment of this material for pelvic peritoneal drainage has been so satisfactory that I have adopted it to the exclusion of all other materials for this purpose. In one instance the intern was about to remove one-third of a strip of this material, twenty-four inches in length, on the third day after operation, from a very nervous patient. Becoming greatly excited she strained and expelled in a serpentine shape the whole of it before he could get hold of it or get her to desist from straining. The two cases mentioned tend to confirm the statement

that it does not adhere to tissues. On applying this gauze it will be thought its rigidity renders it inappropriate, but the temperature of the body readily softens the material, causing it to mold itself as smoothly as plain gauze. This gauze, then I feel may be relied upon to protect denuded pelvic peritoneum for a sufficiently long period of time for endothelialization under it to occur, thus avoiding the much dreaded adhesions of intestine and omentum to such denuded areas and while affording disposal of any accumulated fluids may also be itself removed at any elected time.

I may add I have had opportunity to view several months subsequently a few of the pelves thus drained and in none of them were pelvic adhesions present. I heartily commend the use of this paraffin-stearin gauze as I have employed it and take this opportinuty to thank Dr. Fisher for the publication of his work.

DISCUSSION

Dr. J. Shelton Horsley, Richmond, Va.—The question of surgical drainage is really more a biological than a mechanical one, and there are underlying principles we have to recognize when we drain anywhere. We all know that gauze is very efficient as a drain in carrying off septic material, yet if we want to drain the gall-bladder we would not think of introducing a roll of gauze into the gall-bladder but would insert a tube. If we had a wound that was likely to be infected over which irritating discharges would flow we would put in gauze, and usually it acts satisfactorily.

I think the whole question goes back to the fact that in most if not all cases drainage is a reversal of the circulation of the local lymphatic system. Those of us who were fortunate enough to be barefooted boys will remember that we not infrequently got a splinter in our foot, which would fester and discharge seropus until the splinter was removed, and then the wound would close. This was simply nature's efforts to extrude a foreign substance by pouring out serum, and the lymphatic circulation was reserved to wash the splinter out. In drainage in the

abdomen we have a different biological proposition because the lymphatic supply is enormous and lymph comes out abundantly. When the lymphatic supply is small it becomes a more mechanical proposition, and it is necessary to get drainage at the lowest point. In the abdomen it is quite different; there is a reversal of the circulation of lymph toward the drain, being nature's effort to extrude the tube. If there is an infection the drain tends to promote a reversal of the circulation of the lymph, and instead of absorbing septic material and carrying it into the body it is extruded in an effort to get rid of the drainage tube. The material does not make much difference so long as it is sufficient to excite adequate reversal of the lymphatic circulation in order to prevent the majority of the septic material from being absorbed. Drainage does not always have to be in the lowest point, as drainage of the bladder or of the abdomen. In one instance the muscular organ can contract, in the other the abundant lymph flushes out the sepsis.

Let us take drainage for pancreatitis. Merely putting a tube in the gall-bladder or common duct does drain off the bile to a great extent, but I believe, as Deaver has pointed out in his anatomical studies, that the infection is largely lymphatic, and drainage in the common duct acts as a foreign body, reverses the circulation of the lymph and lymph is extruded along the tube and prevents the absorption of material which would otherwise occur.

Dr. Bovée (closing).—Dr. Horsley has pointed out one of the ways that gauze drains along the pelvis. However, we cannot get away from the influence of gravitation. He speaks of a foreign body, and here we use a foreign body. It was my hope that someone would discuss the matter of pelvic drainage, but inasmuch as no one has done so, I have nothing more to say on it.

Dr. Stone.—I should like to ask Dr. Bovée a question. Suppose the gauze is expelled too quickly by vomiting or otherwise on the part of the patient, might it not be inadvisable to have it so readily expelled?

Dr. Bovée.—Yes, but inasmuch as it has only happened in one case in two and a half years' experience it does not show that it is liable to be expelled prematurely. If it is, it is unfortunate. I mentioned particularly as evidence that the gauze does not adhere to the surface, and it permits endothelialization of denuded areas of pelvic peritoneum to occur without the formation of lasting adhesions.

CURETTEMENT BEFORE SUTURING THE UTERUS IN CESAREAN SECTION, WITH A REPORT OF TWELVE CASES

By Gaston Torrance, M.D.
Birmingham, Ala.

The idea of doing a curettement in Cesarean section was suggested while doing a section for eclampsia. There was a large amount of material at the site of the placenta and the uterus did not seem to contract well, and the patient's resistance was poor. A dull spoon was used and the hemorrhage was controlled better and the uterus contracted down much more firmly.

One of my patients operated on during her third pregnancy for placenta previa told me that her convalescence had been much shorter and that the flow was very much less.

I have operated on 12 cases by this method and feel that the operation is more satisfactory than before we began using the curette. I think it is especially indicated in cases that have been in labor for a long time or where there has been much manipulation.

THE LIMITATIONS OF CESAREAN SECTION

By E. Gustav Zinke, M.D.
Cincinnati, Ohio

For various good reasons Cesarean section is so frequently performed in these days that it is not an easy task to outline definitely the limitations of its proper sphere of application. Prior and up to the introduction of antisepsis and asepsis into the practice of midwifery, the obstetrician resorted to Cesarean section upon living women only when it was impossible to deliver the child, dead or alive, *per vias naturales.*

Four hundred years ago, Ambrose Paré placed a ban upon this operation because of its then frightful maternal mortality. At that time the operation was frequently resorted to by surgeons as well as by midwives, because Jaques Nufer, a swineherd, had successfully delivered his wife in this manner after midwives and surgeons had abandoned her. The ban was gradually lifted with the advent of modern surgery.

With the slow development and final establishment of the doctrine of narrow pelvis, certain compromise operations were introduced into the practice of obstetrics for the purpose of relieving women in difficult labors, the result of deformed, narrow, and contracted pelves. These compromise operations were: The induction of premature labor (England); the high forceps (France); version of the child (Germany); and embryotomy in any of its forms when the deformity of the pelvis was so great as to make the result

of these procedures extremely doubtful, or impossible of execution.

With the completion, and a full understanding, of the doctrine of narrow pelvis, and the introduction of antiseptic and aseptic surgery, these compromise operations lost, almost wholly, their justification and importance. Cesarean section and Sigault's symphysiotomy received new recognition and valuable modifications in technic. Before long, both operations became justifiable and selective procedures in all cases of narrow or contracted pelves in which the test of labor failed to terminate, within a reasonable time, and without injury, the conflict between the mother and the child.

Abdominal hysterotomy was destined to furnish the most surprising and intensely gratifying results, especially when performed early and before other ineffectual efforts at delivery, manual or instrumental, had been made. Because of its successful use, and particularly because of the ease with which Cesarean section is performed, it soon became the favored method of delivery in other conditions than those of deformed, obstructed, narrow, or contracted pelves. Thus the usefulness of this operation promptly suggests itself for the relief of certain cases of puerperal eclampsia and placenta previa. With the improvements in the operative technic, the methods of asepsis and antisepsis, and the establishment of maternity hospitals, the results of this operation became so impressively good that the field of its application was extended to other conditions complicating the last weeks of pregnancy and labor; as, for instance, nephritis, affections of the heart, diseases of the lungs, and other maladies which, though not the result of pregnancy, had so reduced the patient's vitality as to render a spontaneous labor hazardous even in the presence of a normal pelvis and a favorable presentation and position of the child. If we add to this the undeniable fact that the operation itself is not a difficult one, that any young graduate who has witnessed Cesarean section once or twice in any amphitheater may successfully perform

the operation, it is easy to realize why abdominal hysterotomy is now so much in favor with the profession, and why it is resorted to so frequently by surgeons who, admittedly, know little of midwifery, and by young obstetricians of limited experience in the practice of obstetrics.

There was a time, not very long ago, when a successful Cesarean operation challenged not only the admiration of the laity, but also that of the medical profession; and the operator was, naturally, filled with a pardonable pride. The medical press and the newspapers were eager to publish the masterly deed. Thus, a man who placed on record one or more Cesarean sections not only established himself more firmly as an able and highly successful obstetrician and operator in the estimation of his confrères and the community at large, but his success also had a tendency to stimulate others to perform this operation if an opportunity, or merely an excuse for the operation, presented itself.

These statements are not made in an unkind spirit. Every man who is a man has the ambition to do good and useful work, and he is eager to do it not only as well as his seniors and superiors, but, if possible, a little better, and more frequently. The sole object of this paper is to show the reason why the Cesarean operation has so suddenly risen into favor with the profession, and to point out the fact that, if we are not careful, the operation will, ere long, be needlessly and indiscriminately performed at the expense of the real art and science of obstetrics, to the discredit of the profession, and, to a great extent, to the injury of child-bearing women. Indeed, there are even now many competent and conscientious practitioners of medicine, surgery, and obstetrics who do not hesitate to proclaim that the Cesarean operation is performed too frequently, and under conditions not considered wholly justifiable.

For example: It may be a question of serious consideration whether a normally built woman, pregnant at or near term, whose vitality has been reduced to a low state because of the

existence of some chronic affection independent of gestation, may not be as easily, more gently, and as effectually saved from the ill effects of a painful and protracted labor by a timely version or the use of the forceps, as by invading the abdominal and uterine cavities with the knife, even though it be in the hands of a dexterous and experienced surgeon. The same may be said with equal force of the majority of cases of placenta previa. There are some honest, scientifically and practically well-qualified obstetricians, who are quite positive that Cesarean section is never justifiable in this class of cases; yet in spite of their objections, the operation is performed, in some clinics, in every case of this kind. The truth is that the majority of cases of placenta previa may well be carried to a successful termination, for both mother and child, without recourse to surgery; but, at the same time, in a small minority of them, the operation is just as positively indicated as in cases of extremely contracted or completely obstructed pelves.

The same arguments may be employed, only with greater force, when we consider Cesarean section for the treatment of puerperal eclampsia. If there is room for doubt that abdominal hysterotomy is the proper procedure in all cases of placenta previa, certainly it is far more doubtful whether this operation is the best treatment for many cases of puerperal eclampsia. By a process of remarkable mental gymnastics and literary dexterity, some writers have attempted to show that the same good results may be obtained for the mother in the treatment of puerperal eclampsia by Cesarean section as have actually been accomplished by merely medical care. If these ex cathedra desk efforts constitute good and sufficient reasons to justify a resort to this operation in eclampsia, then one must marvel at the amount and quality of mental acumen, and the character of the men who can so lightly disregard the magnificent results achieved for the mother when this malady is treated medically only.

If the success obtained by abdominal hysterotomy in

cases of puerperal eclampsia are "almost as good" as the results secured by strictly medical care, what possible excuse is there for this operation in the disease mentioned except, perhaps, when profound and prolonged convulsions appear without warning, or when severe toxemia manifests itself suddenly in a primigravida with an unobliterated or elongated cervix or an undilated os in conjunction with acute suppression of the urine, and the presence of a general edema and cyanosis? But of these cases we see but few; and the operation will rarely be successful in these cases unless a transperitoneal nephrotomy is performed at the same time. Another justifiable indication for Cesarean section may be found in the consideration of saving the life of the child. And yet we all know that the saving of the child's life, with the aid of this operation, is by no means a certainty. We have then just two, and only two, really justifiable indications for this operation in the treatment of puerperal eclampsia.

SUMMARY. (*a*) Abdominal Cesarean section is positively indicated, as in the past, in all cases in which the child cannot be delivered by any means, dead or alive, through the parturient canal.

(*b*) The operation is not only justifiable, but almost imperative, and should be selected as the best mode of delivery in all cases of deformed, narrow, and contracted pelves in which the diameters are so reduced in size as to forbid the test of labor, the use of the high forceps, or version of the child upon the feet.

(*c*) Abdominal hysterotomy will furnish the best results for both mother and child in all of those cases of placenta previa in which the hemorrhage is either profuse, or moderate and protracted, and beyond control. When an elongated or unobliterated cervix or rigid os complicates placenta previa, Cesarean section is all the more imperative. Fortunately, in the majority of these cases, the hemorrhage may be effectually arrested; elongated cervices are quite rare; and an

unobliterated cervix, or rigid os, usually yields to well-applied tamponade, or the careful and skilful use of the rubber-bag.

(*d*) Cesarean section may be chosen as a just procedure in cases of sudden and profound eclampsia, or severe toxemia in a primigravida when associated with an elongated or unobliterated cervix, acute suppression of the urine, general edema, and cyanosis. In the milder cases of this disease, when the life of the child is considered of equal or more, importance than the life of the mother the operation finds a justification. Intelligent medical care, however, has so greatly decreased the maternal mortality of eclampsia that Cesarean section will seldom be necessary. This fact, more than anything else, renders Cesarean section almost entirely unnecessary in the treatment of eclampsia.

(*e*) As to the advisability of abdominal hysterotomy in cases of asthenia, no matter what the cause, the justification of the operation rests upon the mature and accurate judgment of an able, conscientious, and experienced attendant. That, occasionally, both lives may be saved by the performing of this operation in these circumstances, may be granted; but that the operation will be but rarely indicated for this condition, also admits of no doubt.

(*f*) In the past, Cesarean section was not resorted to often enough; at the present time, it is performed too frequently. In order to guard against an abuse, it may be well to establish the custom that the Cesarean operation should never be performed without the consent of an experienced consultant of recognized standing and an authority on obstetrics.

(*g*) Cesarean operation should never be regarded lightly because it is easy of performance; on the contrary, it should always be considered a formidable procedure, one which may be followed by serious consequences; and it should not be forgotten that, even under the most favorable circumstances, the operation invariably involves extensive exposure of the abdominal and uterine cavities; it means an abdominal and uterine cicatrix; and, nearly always, more or less extensive

adhesion between the uterus, abdominal wall, omentum, and intestines. In addition to this, it is well to remember that the danger from a septic infection cannot be, and never will be, entirely eliminated.

(*h*) The question as to whether an existing septic infection is a contra-indication has been discussed repeatedly and extensively. Judging from the favorable results reported by men who have performed Cesarean section when the patients showed symptoms of "infection," one is led to believe that the cases in which recovery did take place were not really of the type classified as true septic infection, but rather that they were cases of mild sapremia. A strictly septic infection is always systemic and almost invariably fatal; a sapremia is, usually, local in character, and, even if some of the saprophytes do find their way into the circulation, the police force within the organism, as a rule, promptly disposes of them, and the patient recovers notwithstanding the Cesarean section.

VISCEROPTOSIS

By Charles Lybrand Bonifield, M.D.
Cincinnati, Ohio

Knowledge of visceroptosis has been acquired by stages. First, the prolapse and retrodeviations of the uterus attracted the attention of the clinician and treatment by the surgeon. Next the movable kidney occupied the center of the stage. The stomach and the colon then asserted their rights for consideration, and we finally learned that not infrequently all the inhabitants of the abdominal cavity seemed determined to move south.

The etiology of visceroptosis has been explained in various ways by different authors, which means that no explanation yet offered is entirely satisfactory. It seems to me that there is much evidence to prove that the nervous system is a large factor. It is claimed by some that while the nervous system has much to do with producing the symptoms, that there must be something still farther back that produces the stimulus to the nerve or, it may be more proper to say, something that has a paralyzing effect on the nerves and it is claimed that this agent is either germs or other toxins. This is possibly true. It is a good deal like asking the question what makes a watch run. The answer is it is the slow uncoiling of a wire spring. But why does the wire spring uncoil? I have several times mentioned a case with which I am familiar, of an individual who, when he was about twenty-five years of age, and in

very poor health, developed a double inguinal hernia for which he wore a truss for a number of years. A few years later his health becoming much improved, he was delighted to find that the truss was no longer necessary. A long illness of grippe pneumonia, which confined him to bed for about four months, was followed by a recurrence of both hernias. When a year or so later robust health was regained, the hernias again disappeared and have not again been in evidence although more than twenty years have elapsed. Now it is impossible to conceive that strength and weight could have closed these inguinal rings. Strength does not develop muscles particularly in this neighborhood and every one knows that if you filled up the canals with fat, you have a very weak wall as a defense against hernia. What must have occurred is that the intestines and their mesentery regained an amount of tonicity that would no longer permit them to emerge from the abdominal cavity.

In the same way we all recognize that many cases of movable kidney can be greatly benefited if the patient can be made to take on a few pounds of additional weight. I therefore believe that the action of the nerves and the amount of fat in the various supporting structures within the peritoneal cavity are prime factors in ptosis. Later on the retention of food in the stomach and of feces in the colon produces toxemia, that in turn further reduces the nervous tone and may further reduce the body weight. When the various organs have once taken their position in the abdomen at a lower level than is normal, their circulation is interfered with, their veins dilate and there is more or less stasis of blood within them.

With the abdomen opened, the patient in the Trendelenburg position and the intestines packed carefully out of the way, one cannot help noting the dilatation of the veins in the broad ligaments in almost every case of retroversion of the uterus that has persisted for any length of time.

The dilatation of the veins not only increases the weight to be carried by the supports, but weakens the supports by affording faulty nutrition. The peritoneum becomes irritated and adhesions form, holding the intestines or stomach in abnormal position and aggravating the trouble. I have been inclined to think, however, that the role adhesions play in producing stasis has been exaggerated by many writers. No one will deny that at times they produce great discomfort and we sometimes see a dilatation of the bowel immediately above an adhesion or a kink and it is evident that a certain amount of obstruction has existed. On the other hand, when one opens the abdomen of a patient suffering from tubercular peritonitis and finds the intestines coiled and twisted in the most fantastic way and know that these patients have not suffered from stasis, he must realize that normal peristalsis can surmount the difficulties imposed by some adhesions. Only last week I operated on a woman, from whom a surgeon had some six months previous removed the appendix. She complained of great discomfort in the lower abdomen, but there was no symptom that could be attributed to a retarded fecal current and yet I found two coils of the ileum fastened up between the fundus of the uterus and the abdominal wall most securely and in such a way as to form an acute angulation of both.

Among the etiological factors that should be mentioned is failure to heed the call to defecation, which leads to a blunting of the impulse, just as failure to obey the summons of an alarm clock leads to its failure to awaken the sleeper. Women are less apt to heed the call than men, some of them because the facilities are not at hand and others because their multitudinous duties make it inconvenient.

The symptoms of visceroptosis are faulty digestion, malnutrition and a long list of nervous manifestations. The stomach not being able to empty itself between one meal and another never gets a complete rest; performing

its share of the digestive process in a faulty manner, producing toxins that are absorbed as well as much gas that causes great discomfort. The difficulty in evacuating the large bowel leads to the absorption of material that should have been evacuated in this way.

Aside from the feeling of weight and discomfort in the abdomen these patients suffer from malaise, loss of enthusiasm, of energy and of efficiency. The patient is not rested and refreshed by the night's sleep. Later she becomes hysterical, her temper becomes violent and uncontrollable. Melancholia is often present in a marked degree. The skin has a peculiar sallow, muddy color and acne may be present. Cystic degeneration of the breasts frequently occurs. There is often loss in body weight, due not only to toxemia, but as well to the patient's disinclination to take nourishment because of the difficulty in expelling the residue. In some of the worst cases there is a starved appearance, the eyes have a glassy appearance, such as is seen in those nearing death from some exhausting disease like pulmonary tuberculosis.

The diagnosis of this condition has been rendered easy and certain by the roentgenologist. The history of the case and casual physical examination will always suggest the necessity of securing the location of the various organs and ascertain the rapidity with which the various parts of the digestive tract empty themselves.

There is considerable disagreement as to the treatment of these cases, some claiming that the neurologist is the proper individual to treat them, others that the internist best succeeds; others believe that great relief can be obtained by the appliance of mechanical supports, while others claim these cases are essentially surgical and can only be made well by operative procedure. Surgeons themselves differ as to the proper procedure in a given case, particularly in regard to the stomach and the large intestine, some believing that the best results are obtained

by attaching the dislocated viscera to the abdominal wall; others believe that by furnishing the ingested material with a shorter and easier passageway the best results can be obtained. All of which proves that the whole subject requires further study and this short paper is intended merely as a personal contribution to this study and makes no claim to offering a definite solution.

In discussing treatment it is always to be borne in mind that these cases vary greatly in the amount of displacement of the various organs and in the severity of the symptoms produced. Some patients will have a very movable kidney with practically no symptoms. Others will have their stomach largely below the umbilicus and the transverse colon looping into the pelvis and still suffer comparatively little, while others with less marked displacements have a multitude of symptoms. As far as the stomach and intestines are concerned the symptoms seem to be due more to atony of their muscular coat and a weakened peristalsis than to the displacement. Prophylaxis is the best treatment when we are sufficiently sure of the etiology of the disease to apply it and, if the views above expressed are even partially true, it can well be tried. It should begin in the earliest years of childhood and last for two or three decades. Adenoids and tonsils should receive attention, not only because they may be the source of infection and interfere with the proper development of the child, but also because they make the child a poor student and therefore make his school work a burden, when it should be a pleasure; make it a tax on his nervous system. The same is true of eye strain. City children especially should have a certain amount of gymnastic exercise all through their school life. For this purpose I recommend the work done by the German Turnvereins. It not only develops their muscular system, but teaches them how to use it. They are taught how to walk and stand correctly.

Later on in school life, proper dress, diet and exercise

and a sufficient number of hours of sleep together with the right amount of time spent in the open air are important. In short every care should be taken that maturity is reached with a sound, well developed body and a stable nervous system. The milder forms of constipation should be carefully treated in their incipiency. Physicians are all too prone to prescribe some favorite aperient pill for immediate relief and not make any honest efforts to cure the patient. The latter would be just as well off if she had gone to some drugstore and bought some patent medicine.

In this connection it is to be remembered that human beings like other animals are supposed to eat food in which there is considerable waste material. Physiologists tell us that young rabbits fed on exclusive milk diet live but a short time, but if sawdust be added to the milk they can survive indefinitely.

Habit is also very important in preventing or overcoming constipation before it becomes chronic. It is a well-known fact that food in the stomach starts peristalsis of the bowels. Therefore shortly after eating breakfast is the best time for the average individual, living under modern conditions, to go to the toilet. The morning paper or the latest novel should be taken along. It is almost as necessary that the constipated individual have his mind on the business to be attended to, when he visits the toilet, as it is for him who would successfully perform the sexual act. In the way of drugs, strychnin, quinin and ergot are the only ones in which I have much confidence for their tonic effect on the muscular coat of the bowel.

If the physician could only see to it that each of his patients had the kind of employment for which he or she is best suited, he would do much to prevent visceroptosis, but this opens up sociological questions too vast for our discussion today. He can only advise. Some things can be done by medical men using their influence to have

proper toilet facilities in stores, offices, factories and other places of employment for women. There are few American cities in which public comfort stations are as numerous as they should be.

Another predisposing cause is gynecological trouble in women. A torn perineum that destroys the action of the levator ani muscle makes defecation difficult and predisposes not only to prolapse of the uterus, but to a sagging of the other intrapelvic organs as well. Retrodeviations of the uterus by their deleterious effect on the nervous system, especially if complicated by a prolapse of one or both ovaries predisposes to ptosis of the stomach and bowels and, therefore, should be treated promptly.

By following the lines above suggested, I believe the number of cases of visceroptosis in the next generation can be materially lessened. But there are cases in the present generation that are already well developed and the question arises what are we to do with them?

In the treatment of the milder cases, restoration of a healthy condition of the nerves and a gain in body weight is the first desideratum. A patient in my office recently was telling me of a friend who had been permanently cured of constipation by a milk diet and rest in bed. This led me to suspect that many of the nervous cases that were so successfully treated by the Weir Mitchell method years ago were of this type, the visceroptosis not being recognized because the *x*-ray was not in clinical use. I have not had an opportunity to put this thought into practice, but believe it to be well worthy of trial. Recumbent posture relieves venous stasis; the rest quiets the nerves and the forced feeding of a nutritious diet in which there is little waste causes gain in weight and gives the stomach and intestines a chance to return to their normal caliber.

In some other cases, best results are obtained by exercise, massage of the abdomen and a less restricted diet, with about twelve hours out of the twenty-four in bed. In the

use of mechanical appliances, I have had little experience and not very satisfactory results. A well-fitting front-lace corset applied before the patient arises in the morning and laced from the bottom upward has seemed to me to accomplish as much as any specially devised apparatus.

In the surgical treatment of this condition, it is not every case that requires restoration to its proper position of every displacement. For years I have called my assistants' attention to the fact that when an abdomen was opened for gynecological operations, we frequently find the stomach presents itself at the upper end of the incision of ordinary length below the umbilicus and the colon in the pelvis and yet these patients did not complain of any gastric or intestinal symptoms after they had recovered from the operation.

In some of these cases palpation of the kidney will show it is abnormally movable and still the patient will have no symptoms after she has recovered from the operation in the pelvis. All of this will show that if we relieve the nervous system of some of its burden, it may effectually carry the remainder. Other cases will require that the kidney also be fixed.

Plication of the stomach and of the cecum may be indicated when these organs are greatly dilated. Fastening of the stomach and colon to the abdominal wall never did appeal to me and, therefore, my experience with it has been very limited. Dr. J. Riddle Goffe read a paper before the Section on Abdominal Surgery of the American Medical Association at Chicago this year, describing an operation of this kind. It was published in the *Journal* for October 5, 1918. It is ingenious but complicated and there would seem to me to be great danger of it producing angulation more acute and troublesome than that it was supposed to remedy. In one of his cases he found the transverse colon so long that it was necessary for him to resect about eight inches of it to prevent this angulation.

In the first case of ileosigmoidostomy I performed I found a similar condition. It was reported in the *American Journal of Obstetrics* for February, 1913. It seems to m ileosigmoidostomy is the much more logical procedure i such a case and it is my observation that the worst cases we encounter, have this great elongation of the colon.

Some of my cases of ileosigmoidostomy have been under my observation for five years and are still doing well. In none of my cases have I found it necessary to remove the colon, though the colon was removed in one case by a surgeon while I was out of the city. I have always felt that his youthful enthusiasm led him to do an unnecessary operation. Some of them have had slight trouble with feces getting into the colon above the anastomosis, but to the best of my knowledge in none of them has it been serious and as time went on it became less and less frequent.

Reed, of Cincinnati, for a time removed the colon in all of his cases of ileosigmoidostomy, but he found the operation attended with a high mortality rate. In later operations he left the colon, but severed it just above the anastomosis and brought that end out to the skin on the right side of the abdomen and the end of the ileum out on the left side so he could wash through and through the unused portion of the bowel. I believe his results with this procedure were very satisfactory and that he never found it necessary to remove the colon afterward. I think the same beneficial results might be obtained by doing an ordinary appendicostomy or cecostomy without severing the colon. The mucus and any feces that accumulated in the transverse colon could be washed into the lower bowel; but my experience, though limited, would lead me not to do even this until symptoms indicating it arose. I performed cecosigmoidostomy on three patients, but my results were not as satisfactory as I have always obtained from ileosigmoidostomy. A large part of the fecal current continued to flow through the old channel and to produce the old symptoms.

The result of my study and experience with this condition would lead me to believe that many cases require no surgical treatment, that others require operative treatment only for the pelvic condition, that others will require fixation of the kidney as well, that for the type where colonic stasis is most severe ileosigmoidostomy is the best procedure yet devised, and that the colon should be removed at a second operation and only when symptoms make it necessary.

DISCUSSION

Dr. Charles A. L. Reed, Cincinnati, Ohio.—There are just a few points which I wish to emphasize in the very brief time at my disposal. The first is that some degree of displacement of the gastro-intestinal tract exists in exactly 100 per cent. of the cases of chronic convulsive toxemia, heretofore called epilepsy, that come under my observation. As I have now seen many hundreds of these cases I am firm in the conviction that the conditions in the abdomen are, collectively, the gross cause of the constitutional state and the convulsive seizures.

The next point that I wish to emphasize is that the gross displacements revealed by the *x*-rays are only a part of the associated pathology. One of the most important changes, also constantly found on opening the abdomen in these cases, is retarded circulation in the mesenteric veins, which are often not only dilated but black with sluggishly moving blood. It has been conclusively demonstrated *in vitro* that convulsive producing poison is developed in static blood, and because of its stasis. Why may it not develop equally in static blood and because of its stasis *in vivo?* The logic of my work shows that this is precisely what does occur.

The third point that I wish to emphasize is that no one operation, no single surgical trick, can be relied upon to meet the complex associated conditions of these cases. Every one of these cases is a problem case, to be studied individually, and to be treated by a surgeon with all the resources of surgery. Any narrower view is dangerous and will lead to disaster.

The fourth and final point upon which I cannot dwell with too much emphasis is that this work is entirely justified by its already ascertained final results. I have not yet published my whole statistics and shall not do so until the cases have been of sufficiently long standing to place the results beyond any possible doubt. I am, however, keeping track of the cases, by a system of follow-up inquiries sent out every few months. The replies to those sent out for December are just coming in. As I was leaving home those that had arrived by that morning's mail were handed to me by my secretary to be read en route, and with no idea that they would be in point in the proceedings of this meeting. I have not read them, but I now hold them in my hand and shall read them here and now in your presence. Anyone desiring is at liberty then to read them for himself. I may explain that in the circular of inquiry the date of the operation is given and that only three questions are asked, namely, What is the present state of your general health? What is your present condition as to constipation? What is your present condition as to seizures? I will read the date of the operation first, the answers afterward, but without repeating the question in each case as follows:

Case I.—Operation July 10, 1915. General health now "very good"; constipation "very much improved." "I have no seizures. Married January, 1916, and have two very strong well baby boys."

Case II.—Operation June 5, 1916; general health now "perfect"; constipation "perfect"; seizures, "perfect."

Case III.—Operation December 1, 1914; general health "good"; constipation "fair"; seizures, "none for four years since operation."

Case IV.—Operation January 13, 1915, now general health "good except catarrh in head"; constipation "not to speak of"; "no seizure since September 21, 1915."

Case V.—Operation, March 16, 1916; now general health "good"; "no constipation since second operation March 2, 1917; no evidence of grand or petit mal since first operation." The father of this case, who sends in this report, adds: "I cannot see how a single case like H————, spectacular, even dramatic, in its history, could possibly be reconciled by the medical profession with anything but a great achievement in this great fight."

Case VI.—Operation December 20, 1916; now general health "good"; constipation "good"; seizures "good."

Case VII.—Operation March 28, 1916; now general health "good"; constipation "no trouble"; seizures, "never had any trouble since operation." (This is a physician again at practice.)

Case VIII.—Operation January 29, 1917; now general health "good"; constipation, "am still irrigating bowels and am taking occasional calomel and soda from Dr. D."; seizures, "none since November, 1917."

Case IX—Operation October 20, 1916; now general health "good"; "am still much bothered with constipation; take medicine for it once or twice per week." "Had seizures about once per month for the first year, but have only had one in the last twelve months."

Case X.—Operation December 4, 1914; now general health "very good"; "no constipation"; "no seizures since February, 1915."

Case XI.—Operation June 27, 1916; now general health "O. K."; constipation, "very little trouble whatever"; seizures, "had one attack October 27, 1918, when in hospital for influenza and kidneys were not functionating properly. That is the only seizure I have had for a year or more."

Case XII.—Operation October 9, 1916; now general health "good"; constipation "improved"; seizures, "entirely free since operation."

Case XIII.—Operation December 23, 1916; now general health "good"; constipation, "must irrigate every day"; seizures, "they do not come as often as before and the majority are not as hard."

Case XIV.—Operation March 15, 1917; now general health "good"; constipation "good"; seizures "are lighter and come over me as a flash part of the time and another time with twitchings in the right side."

(At this point the reading of the case reports was interrupted by expiration of time. The remaining case reports were in hand and are inserted to complete the record.)

Case XV.—Operation May 22, 1917; now general health "very good indeed"; constipation, "three actions per day"; seizures "very much improved, so much in fact that they have grown quite unnoticeable."

Case XVI.—Operation April 10, 1916; now general health "quite good"; constipation, "by drinking hot water every morning have little trouble; take a dose of physic occasionally."

Case XVII.—Operation March 10, 1915; now general health "very good"; constipation "good"; seizures "not so often and lighter."

Case XVIII.—Operation July 12, 1917; now general health "real good"; constipation, "fairly good"; seizures, "have not had any and have had only eight sensations that I know of. Have been working since last March."

Case XIX.—Operation September 13, 1915; now general health "fair"; constipation "not bad"; seizures, "once a month or two months I suffer from petit mal. It has been nearly two years since I suffered from grand mal."

Case XX.—Operation May 18, 1916; now general health "fairly good"; am just recovering from influenza"; constipation, "no better or worse"; seizures "very good; one last year and one so far this; both very light; have not been unconscious since October 8, 1916."

Case XXI.—Operation October 5, 1916; now general health "fairly good"; constipation, "bowels very regular"; seizures "very good."

Case XXII.—Operation October 26, 1914; now general health "am surely feeling better"; constipation "much helped"; seizures "lots further apart."

Case XXIII.—Operation October 12, 1914; now general health "fine, never felt better in my life"; "still somewhat constipated"; seizures, "I am getting along fine."

Case XXIV.—Operation June 27, 1918; now general health "fine as can be"; constipation "does not trouble me at all" seizures, "still have them; my mind is as good as it ever was." (This was a bad mental case.)

Case XXV.—Operation July 16, 1917; now general health "fair"; "do not get constipated"; "have about one seizure a month." (Formerly occurred every week.)

Case XXVI.—Operation November 23, 1916; now general health "good"; "am not constipated when I am careful what I eat"; "have had only five seizures this year." (Formerly had two to twelve per day as often as every week.)

Case XXVII.—Operation January 6, 1917; now general health "very much improved"; "have to take a laxative every day"; "have had only two seizures in eight months, the last in August. I work every day."

Case XXVIII.—Operation July 2, 1917; now general health "fairly good"; constipation "not troubled"; seizures "not so frequent or severe."

Case XXIX.—Operation July 12, 1916; now "in perfect health physically and mentally"; he has been more constipated since the operation than before; seizures, "about one a week"; (This is a bad result that must be looked into.)

Case XXX.—Operation March 2, 1917; now general health "not very good"; constipation "good"; seizures, "have them occasionally."

Case XXXI.—Operation July 27, 1915; now general health "very good"; "operation apparently cured constipation"; "for the past year and a half have had slight attacks every month."

Case XXXII.—Operation March 9, 1917; now general health "not so good since August"; "bowels move freely two or three times daily, bad odor; ferment look; lots of gas"; "since operation had seizure in June and September, 1917, then free for a year, since when he has had two"; "it seems something has gone backward since August."

Case XXXIII.—Operation May 25, 1915; now general health "good"; "little or no constipation"; seizures, "none for two years almost."

Case XXXIV.—Operation May 22, 1918; now "aside from occasional sick headache, condition very satisfactory"; constipation "much improved"; seizures, "have had but one following several days of indiscriminate eating."

These are the reports just as they have come in in one day. They represent, I believe, all classes of cases, and probably all forms of operation that I have done. The most of the reports cover too short a period to justify a final finding as to cure. It will be observed that some have cleared up quickly, others slowly, while one or two seem to have suffered relapse. It is that way all through the whole list covering several hundred cases. It is for precisely this reason that I am not yet giving out my final statistics. These returns are, however, presented at this time simply to show the trend of this work and of the results so far realized. I think that in view of the otherwise hopelessness of these cases, and in view of what is here shown, further effort not only by myself but by others, is both justified and demanded along lines which I have laid down in my previous communications to the profession.

Dr. Robert Carothers, Cincinnati, Ohio.—I want to say to the Secretary that if I am on earth and am able to get to the

next meeting at New Orleans I will read a paper entitled "Shoes." You will not find trouble of this character in people who have good feet. You will find good feet in people who wear good shoes. The American women universally have bad feet. There is not one in ten who has a good pair of feet. That is the reason for the title of my paper. Good feet make good bodies. Feet are the things that get us on earth right. When we are on earth right, the rest is right.

Dr. Bonifield (closing).—I have nothing in particular to say except to emphasize a point Dr. Reed brought out, which I mentioned also in my paper, and that is, venous stasis both in the pelvis and in the mesenteric vessels I consider an exceedingly important factor in all these cases, and many cases can only be relieved by a surgical procedure. Some of the earlier cases, if the treatment is persisted in, can be relieved by keeping them in the recumbent position continuously or for the greater part of every twenty-four hours.

AN UNUSUAL GUNSHOT INJURY OF THE MUSCULOSPIRAL NERVE

By Francis Reder, M.D.
St. Louis, Mo.

A musculospiral nerve injury with its sequela presents phases of unusual interest. The nature of the lesion, the time of its infliction and its location have an important bearing upon any prognostications that might be ventured.

The seriousness of a nerve injury can never be accurately judged from the symptoms observed. Nerve damage may be slight, yet the injured portion of the nerve may be lying in a mass of lacerated tissue and suffer seriously through the resulting cicatrization of these damaged structures. An apparently mild trauma of a nerve can engender changes in its internal architecture that may result in complete blocking of its conductivity. A nerve injury exhibiting consequences which can be directly ascribed to it, has only one alternative, that of careful exploration and investigation. An exploratory measure promptly undertaken will not only clear up any suspicion of nerve damage, but it will, in case the nerve requires no surgical aid, be of material benefit in removing clotted blood and otherwise caring for the wounded nerve if it be in the immediate proximity of damaged bone. Should the nerve injury require suture, then the exploratory measure will prove of definite value, inasmuch as primary suture of a damaged nerve gives a far better prognosis for anatomic and functional restoration than does late suture.

A few of the above facts are embodied in a gunshot injury of the left musculospiral nerve in a young woman who was attacked, the assailant facing her and standing at an oblique angle, about five feet distant when he fired the shot. The ball, a 25-caliber missile, entered about one and a half inches above the anterior axillary angle, and, ranging downward, found its exit at the posterior axillary angle. About eight hours later, when the patient was seen by me, she had fully recovered from the shock, and the only condition that seemed to distress her was inability to use the left arm and hand.

From the condition of the left hand, which was in a pronounced "wrist-drop" position, the inference could be readily made that the musculospiral nerve had been injured.

The paralysis of the triceps, the extensores carpi ulnaris and radialis, the extensor communis digitorum and all the extensor muscles of the thumb, together with loss of sensibility of definite areas on the back part of the arm and forearm and hand, gave evidence that the nerve was seriously injured; in fact, the diagnosis of a complete division of the nerve was ventured. An immediate operative measure was suggested to the patient and was accepted.

The location of the wound caused by the bullet made it speculative as to the best method of approach.

An oval flap joining the points of entry and exit with its concavity upon the inner part of the upper arm was decided upon. The flap was dissected down upon the chest wall and the axillary space fully exposed. The approach proved to be a very satisfactory one. After removal of much clotted blood the anatomic structures were revealed by a careful dissection and the relationship of vessels and nerves became readily demonstrable. After a thorough inspection of the musculospiral at the supposed site of injury, much to my surprise, everything was found intact; not only did I fail to find the divided musculospiral nerve, but I could not even see where the nerve was injured. It was an exasperating condition to be in, and I began to feel as though I might be

lacking in definite anatomic acquaintance. In my desperation I recalled an interesting dissertation about nerves suffering from a peculiar form of injury known as concussion. The characteristic feature of such an injury was that the nerve was not touched, but was damaged by the vibrations caused by the passage of the bullet. These vibrations can be sufficiently severe to affect the nerve fibers and cause conductivity to be suspended, making it often impossible clinically to distinguish between severe concussion and nerve division. However strong as was my inclination to accept this version, I could not reconcile myself to apply it in this case, and the search for the lesion was continued. That my anatomical knowledge might have caused me to err, did not weigh heavily upon me, because I never lost faith in the size of the nerve I held under suspicion—it was the largest nerve present. Furthermore, I felt certain of its location as the structure was found behind the axillary artery upon the subscapularis, teres major and latissimus dorsi muscles and could be followed backward upon the long head of the triceps, toward the musculospiral groove. Furthermore, the superior profunda artery was recognized in the immediate vicinity. This vessel had been severed by the bullet. The manipulations dislodged the clot and it started to bleed, making it easy of recognition. Fortified with these anatomical facts the identity of the musculospiral seemed absolute. Imbued with the certainty that the nerve had suffered an injury, a most assiduous investigation was instituted. With the aid of a gentle irrigation of saline solution the field was cleared of all accumulated blood that vision might not be hindered. Viewing that portion of the nerve which lay in the track of the bullet, nothing unusual presented itself, the nerve appearing smooth and symmetrically rounded. Upon very close inspection, however, there could be seen upon the middle of the nerve sheath a reddish-brown line about a half inch in length, running parallel with the axis of the nerve. An endeavor to brush away with gauze this reddish-brown line

was unsuccessful. It was then that the thought possessed me that the bullet passed through the nerve, without inflicting gross damage to its investing sheath.

It became now an easy matter to demonstrate the injury. With delicate forceps the neurilemma opposite the reddish-brown line was caught. By gentle traction in opposite directions the opening in the nerve was readily disclosed. The reddish-brown deposit, which was coagulated blood clinging to the lacerated nerve sheath, was continuous with extravasated blood upon the internal structure of the nerve, and plainly disclosed the path of the bullet. On the side of the nerve where the missile found its exit, a similar deposit of coagulated blood was seen clinging to the edges of the severed neurilemma.

Inspection of the nerve wound made it apparent why conductivity was lost. It now became a matter of speculation to what extent the axis-cylinders and the minute internal architecture of the nerve had been destroyed. This was of much importance, inasmuch as the care of the wound in the nerve depended upon some definite conclusion. Examination of the nerve wound, after all extravasated blood had been removed by gentle scraping with a sharp knife and douching with saline solution, revealed nothing whereby the extent of the damage to the nerve structures could be judged. The clinical picture, depicting complete paralysis and loss of sensation of the structures supplied by the nerve, gave the only positive evidence of the seriousness of the injury.

In deciding upon a surgical measure for the wounded nerve the guiding principle reposed in the proper approximation of the axis-cylinders and the preventing of connective tissue intervention from the outside during the process of repair. The question of suturing the nerve wound in a manner that would pucker the nerve was considered. It was, however, dismissed on account of the pressure the suture would exert upon the nerve tissue, and the unavoidable tension which

would be caused by the puckering, two conditions that must be avoided in nerve surgery.

The most feasible measure for this character of injury seemed to be the one which assured good apposition of all neurological structures in the track made by the passage of the bullet. It was reasoned that a gentle compression of the injured portion of the nerve, maintained for about three weeks, would give just as accurate an axonal contact and hold out just as encouraging an outlook for the regenerative potency of the nerve, as would any other surgical measure less free from traumatism. In accepting this procedure the fact was borne in mind that a nerve which had been injured so that its axis-cylinders are seriously damaged has developed in it a type of connective tissue through which the axis-cylinders do not subsequently pass and which leaves a permanent paralysis.

The application of this gentle compression measure entailed a simple technic, the only additional traumatism being the borrowing of a strip of muscle tissue from a convenient muscle—in this instance the strip was taken from the long head of the triceps—sufficiently large to be wound around the injured portion of the nerve with a generous encroachment upon its uninjured portion. To make the compression effective, it was necessary that both ends of the muscle strip be secured. This was done by anchoring the ends with a catgut suture to muscle tissue in the immediate vicinity. This procedure embodied two principles, that of a compression sufficiently firm to make axonal contact certain, and that of a prevention of connective-tissue intervention from the outside. In all nerve injuries it is desirable to have a union free from the ordinary connective-tissue type. All repair must be made by means of the proliferation of glial tissue in the large axones. It is the neuroglia type of connective tissue with its positive chemotactic attraction which favors the transmission of the axis cylinders and is of great value in nerve regeneration.

In choosing muscle tissue over other tissues, such as fat or fascia, a definite purpose was entertained. In muscle tissue there was an elasticity and a tone that was absent in fat. With fat only an unsatisfactory compression could have been accomplished, whereas with a fascial strip the purpose might have been accomplished with the risk of exercising too severe a prolonged compressing of the nerve on account of the density and inelasticity of the tissue. This would have most likely defeated the purpose for which it was intended. The strip of muscle tissue embodied all the requisites called for and the subsequent regeneration that took place, with complete restoration of function and sensation gave full attestation to its value. After closure of the skin wound and proper drainage of the axilla the arm and hand were comfortably splinted, the wrist-drop being kept in a slightly overcorrected position. Fortunately for the patient, healing of the wound was not retarded by inflammation. For the first ten days there was a marked edema of the fingers and hand, extending to about the middle of the forearm. The edema subsided slowly and had fully disappeared when the patient left the hospital, three and a half weeks later.

The following data were obtained as the patient presented herself for examination:

Two months after the injury, which happened December 30, 1917, at 2.30 A.M., no sensory nor motor recovery was in evidence. The muscles of the hand and forearm appeared atrophic.

On March 28, twelve weeks after the injury, the patient called and stated that two days before she was able to move her fingers. Examination revealed that sensation (pin-prick) in the anesthetic regions had returned and that the patient was able to slightly move her wrist and her fingers at the metacarpophalangeal joints.

On May 30, 1918, twenty weeks after the injury, a marked improvement had taken place both in sensory and motor recovery. The wrist-drop was still pronounced; she could, however, effect four-fifths of a hand closure.

On July 16, twenty-six weeks after the injury, the wrist-drop had greatly improved. There was, however, still a slight finger-drop. The patient was able to grasp and hold objects with a sense of security. The muscles of the hand had taken on their normal appearance.

On October 28, forty weeks after the injury, the wrist-drop had entirely disappeared. The patient could make a full fist and sensory and motor recovery could be accepted as normal, with the exception that there still was a peculiar "dead" feeling in the ends of her fingers and that she was not yet able to pick up a pin.

OSTEOCHONDROMA OF THE RIBS

By John C. A. Gerster, M.D.
New York

Chondroma of the ribs is a relatively rare condition. According to Virchow's classification of chondromata of the bones the order of frequency places chondromata of the ribs in the fourth of five classes.[1] In 1881 von Speicher[2] was able to collect only 28 cases.

There is a history of trauma in a considerable proportion of the cases.[3] Individuals exhibiting multiple cartilaginous or bony exostoses—distinctly hereditary affection—in several instances have had a chondroma develop to such a size as to require surgical attention.[4 5 6 7 8] With these consid-

[1] Virchow, after Sudler, Surg., Gynec. and Obst., December, 1914, p. 761: Knochengeschwülste aus dem Franz Josef Kinderspital, 1860. 1. Bones of the hand. 2. The hollow bones—tibia and femur. 3. The jaw, pelvic bones and scapula. 4. Ribs, skull bones (especially the occipital bone). 5. Vertebræ, sphenoid, sternum.

[2] Deutsch. Ztschr., f. Chir., 1881, xv, p. 525.

[3] In 6 of von Speicher's twenty-eight cases there was a history of trauma; C. O. Weber (quoted by von Speicher and by Sudler) reports mention of trauma in 50 per cent. of histories if carefully taken. Sudler (ibid.) cites other references bearing on this point (pp. 762, 763).

[4] Gangolphe and Gabourd (Rev. d'Orthop., May, 1907, p. 201) give a list of 51 references at the end of their article dealing with the development of large chondromata in an individual exhibiting multiple exostoses (briefly abstracted below).

[5] Makara: Pest. Med. Chir. Presse, 1910, p. 156, Chondrosarcoma of a Rib with Multiple Benign Exostoses (briefly abstracted).

[6] McGavin, L. H.: Tr. Path. Soc., London, 1902, p. 356, Multiple Osteoma Associated with Chondrosarcoma of the Ribs.

[7] Vautrin: Rev. Med. de l'Est., 1907, p. 427, Osteogenetic Exostoses Associated with Osteochondromata of the ribs (briefly extracted below).

[8] Zentralblatt f. Chir., 1913, p. 1737.

erations in mind it may be of interest to cite the following case, in which a large chondroma of the ribs developed after trauma in a man with bony exostoses of humerus and tibia of over forty years' standing.

R. S., aged sixty years, a foreman in a cable and hoisting machinery plant, presented himself to me on April 26, 1918, giving the following history: About the middle of July, 1917, he accidentally fell while working and struck the left side of his chest against a radiator; he was carrying a package in his arms at the time and thus was prevented from putting out his hand to save himself. The site of injury became swollen about three months later, but little attention was paid to it; at the end of six months it began to grow more rapidly, and for the past three months the increase in size had been marked. Some abdominal discomfort after meals had been noted for the past two months.

Upon examination a large, flat tumor, the size of a man's flat hand, was found to involve the left lower thoracic wall from a little in front of the nipple line to a little behind the posterior axillary line; the tumor's lower margin corresponded with the free margin of the ribs. The external surface of the tumor was flat and smooth and raised fully one inch above that of the adjacent chest wall; the overlying skin was tensely drawn. There was a sense of elasticity over the center, but the margins were hard, smooth and fixed to the ribs. It was flat to percussion. There was no tenderness.

An *x*-ray plate (Fig. 1) taken the same day, April 26, showed the tumor to have grown much more within the thorax and abdomen than externally; the anteroposterior view showed the tumor shadow almost impinging against the spinal column. The radiographer, Dr. L. D. Weiss, reported an "osteochondroma—almost entirely chondromatous—involving the seventh, eighth, ninth, tenth, eleventh and twelfth ribs."

Besides the tumor of the thorax there were exostoses of the

upper right humerus (Fig. 2), noted since the age of twenty-two, when he threw a ball and felt a sharp pain in his right upper arm near the shoulder (he has not been able to throw since then) and of the right fibula (Fig. 3), noted since the age of eighteen. His father also had "a lump on his arm but it never bothered him." The rest of the patient's past history was of little interest; he had always enjoyed good health and was the father of eleven children. His bowels were regular and appetite good; there was no loss of weight and he slept well.

Physical examination revealed him as a spare man of slight build, in good general condition, presenting no abnormalities besides those noted above. Diagnosis: Chondroma of the left lower thorax, involving the ninth to twelfth ribs and invading both the abdominal and the thoracic cavities.

Operation took place on April 30, 1918: "Excision of chondroma, involving the ninth, tenth, eleventh and twelfth ribs and lower chondrocostal margin." Surgical narcosis was established in the usual manner; then from the moment of opening the pleura until the completion of the operation intrapharyngeal insufflation was employed, using small quantities of ether in addition to nitrous oxide and oxygen. The respirations were quiet at all times and the color was good. The pulse did not rise above 90.

The skin incision began in front in the median line about three fingers below the ensiform; it then ran backward, skirting the lower margin of the tumor almost to the spines of the vertebræ. Skin and subcutaneous fat were dissected free from the tumor, forming a flap with the base uppermost. The abdomen was now opened by a transverse incision close to the left costal margin, and by introducing the hand one could feel the coral-like surface of the abdominal aspect of the tumor; there were no adhesions. Beginning at the posterior angle of the abdominal wound and going clear of the tumor, one inch of the twelfth, eleventh, tenth and ninth

ribs was resected. Intercostal vessels were clamped as encountered. By introducing the hand into the thorax it was determined that the upper margin of the mass had been reached, accordingly the soft parts of the eighth interspace were now divided as far forward as the anterior margin of the tumor; here the incision ran downward, dividing the costal cartilages well away from the tumor, which now was entirely free except for its attachment to the diaphragm. This was severed, completing the extirpation. The left lung, pleural cavity and pericardium seemed normal to gross inspection.

Closure began by uniting the cut margins of the diaphragm and abdominal wall. When this was done there was considerable tension directly on the pericardium, which was partly relieved by incising the upper surface of the diaphragm transversely to its muscular fibers, but not injuring the subdiaphragmatic fascia. This superficial incision was one and a half inches long and lay one inch from the diaphragmatic pericardial junction. The left pleural cavity was closed by suturing the skin flap to the upper surface of the diaphragm about two and a half to three inches above the flap's cut edge. There was no tension. This left the subcutaneous fat in contact with the lung for a space three inches long by one and a half inches wide. (No. 2 chromic catgut was used throughout.) The skin was closed with a running suture of silk. A dry, compressive dressing was then applied.

Specimen. "The tumor removed from the lower chest wall weighs 1200 grams. It measures 16.5 x 12.5 x 11.5 cm. The abdominal aspect is covered with numerous coral-like excrescences and is stony hard (Fig. 4). The external surface is smooth and fluctuates. Incision into this surface reveals cartilaginous tissue in which there are numerous spaces filled with clear, slightly yellowish, mucoid fluid (Fig. 5). Through the midst of the tumor pass several ribs and their cartilages. Microscopically the tumor is an osteochondroma."

Dr. A. O. Wilensky kindly furnished me with this pathological report.

There was uneventful convalescence. Temperature was a little above 100° from the sixth to the twelfth day and normal thereafter. A slight marginal necrosis of the skin developed along the lower border of the large skin flap; it was one-half inch wide and four inches long. The patient was discharged on the twenty-sixth day after operation. There was some effusion in the left pleural cavity a few days after the operation, but on the day of discharge breath sounds and good resonance extended to the fifth rib, with flatness from there downward. *X*-rays showed poorer aëration of the left lung than of the right.

December 12, 1918 (seven months after operation) the patient presented himself in good general condition. He is able to work as a foreman (his old job). The accompanying figures (Figs. 6 and 7) show distant and near views of the patient holding his own tumor; the scar of the skin incision, the defect in the lower chest wall and the relative size of the tumor mass are to be noted. Fig. 1*a* shows an *x*-ray taken at this time of the operated region.

The pathology and classification of chondromata have been clearly outlined in recent articles by Sudler[1] (1914) and by Wagner[2] (1916). As these articles are readily accessible there is no object in going over the same ground here.

Surgical Technic. Great strides have been made during the present war in simplifying the prevention of collapse from operative pneumothorax. In the light of our present knowledge it may be of interest to review for a moment a few important landmarks of the past. In Parham's classical monograph on *Tumors of the Thoracic Wall* (read before this Association in 1898) he referred to Müller's case, where traction upon a tumor of the lung relieved the distress of pneumothorax (page 53) and also mentioned John B. Murphy's experiment of steadying the mediastinum with a

[1] Loc. cit.

[2] Surg., Gyn. and Obst., November, 1916, p. 604.

forceps (page 124). Yet these demonstrations did not receive the attention they deserved. It remained for the vast material of the present war to bring out in the work of Duval,[1] Bastianelli and Gask and others the soundness of these earlier observations. Nowadays in removing foreign bodies from the lung the pleura is opened widely, the pneumothorax is disregarded, the collapsed lung is grasped with a forceps and is pulled out of the wound just as a loop of intestine is delivered during an abdominal operation. Thus, for operation upon one side of the chest, differential pressure has largely been eliminated. However, differential pressure in simplified form still has its place in operations when there is a possibility of opening both pleuræ. The simplest method of its administration is intrapharyngeal insufflation. In 1913 Zaaijer, the Dutch surgeon, demonstrated by animal experiment that it was perfectly feasible to maintain positive pressure by means of tubes introduced into the pharynx through the nostrils. The air escaped through the gap between the soft palate and the epiglottis. Respiratory movements continued, although both sides of the chest were open. A sound could be passed into the esophagus without disturbing the air pressure.

For several years past, William Branower, the anesthetist, has been able to verify the experiment work of Zaaijer[2] while anesthetizing the thoracic cases of Lilienthal. Branower has found that one tube of 18 French caliber suffices. In the author's personal case, reported above, the left lung was partly collapsed during the time the pleura was open; this was very convenient, for the lung did not bulge into the wound. While it would have been perfectly possible to dispense with differential pressure in this case, by having an assistant seize and hold the lung, yet with a skilled anesthetist available it was far more convenient to leave the control of the lung to one outside the operative field and devote oneself to the tumor alone. It seems as though the more

[1] Revue de Chirurgie, Paris, 1916, li, 365.
[2] Loc. cit.

complicated intratracheal anesthesia will be reserved for preventing aspiration pneumonia in operations on the tongue and jaws, while the simpler intrapharyngeal anesthesia will find increasing favor in operations on the chest because it can instantly and easily be applied when artificial respiration is required in emergency.

Cases of total unilateral pneumothorax, in which no differential pressure apparatus was used and in which no mention is made of steadying the mediastinum by grasping the lung, have been cited in the literature in sufficient number to justify mention. It is expressly stated that upon wide opening of the thorax incidental to removal of a tumor of chest wall (usually a large growth), although the lung totally collapsed, there was no dyspnea. Piollet,[1] while an interne under Poncet, reported the case of a woman, aged thirty-one years, operated upon by Delore for a tumor (chondroma) the size of two palms of the hands, involving the seventh, eighth and ninth ribs. The chest wall was opened; the lung was found compressed, but free from adhesions; there was no dyspnea. In the discussion which followed similar cases were cited by Bazy and by Vallas.

Rigollot-Simmonnot and Huguier[2] reported a case of a costal chondroma necessitating extensive resection of the thoracic wall followed by total pneumothorax, with no untoward symptoms. The patient was a man, aged fifty-two years. Sourdille[3] cited the resection of a large ostosarcoma of the rib in a boy, aged eleven years, with wide opening of the pleura and production of pneumothorax (the lung was previously compressed by serohemorrhagic exudate). No untoward results. Whipple and Webber[4] report a sarcoma of the sixth rib removed, necessitating opening of the pericardium and pleura, with no untoward results. No differential pressure was used.

[1] Lyon Médicale, 1901, p. 116.
[2] Paris Chirurgical, 1910, p. 258, and ibid., 1913, p. 609.
[3] Gazette Méd. de Nantes, 1908, xxvii, 31.
[4] Lancet, November 10, 1900, p. 1047.

Fig. 1.—X-ray of osteochondroma involving ninth to twelfth left ribs; the tumor projects far into the abdominal cavity so that its shadow nearly reaches that of the vertebral column. Externally it does not project more than one inch beyond the surface of the thorax.

Fig. 1*a*.—X-ray taken seven and one-half months after operation. Note operative defect, high situs of diaphragm and denser shadow over left lung—partially collapsed.

Fig. 2.—Osteoma of right humerus of more than forty years' standing.

Fig. 3.—Osteoma of right fibula of over forty years' standing.

Fig. 4.—Abdominal aspect of tumor—stony hard, with coral-like excrescences.

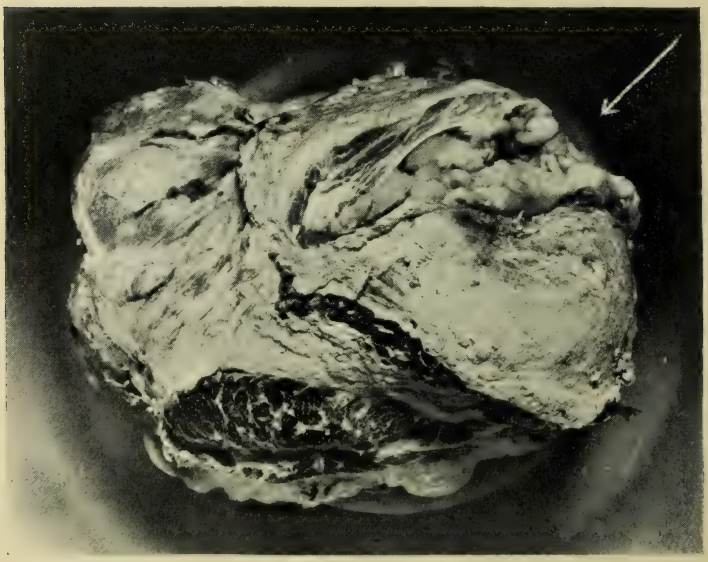


Fig. 5.—External surface of tumor—arrow indicates incision made after removal, revealing cartilaginous interior.

Fig. 6.—Patient seven and one-half months after operation, holding tumor to show its relative size. Note remainder of anterior left costal margin, operative defect of thoracic wall and scar of transverse incision.

Fig. 7.—Closer view of Fig. 6.

POLYPOSIS OF THE STOMACH

By D. C. Balfour, M.D.
Rochester, Minnesota

The benign tumors of the stomach, fibromas, myomas, and adenomas, because of their relatively low incidence, obscure symptomatology and unknown etiology have always been of great interest, particularly from a surgical standpoint. It was, then, with considerable satisfaction that we recently added to our collection of benign gastric tumors a perfect specimen of the rarest member of the group, a gastric polyposis. The fact that this is the first time the condition has been found in approximately 69,000 abdominal sections in the clinics, 8000 of which were for gastric lesions, and that a correct diagnosis was established before operation, is sufficient to make the case most unusual.

Case 250518, a man, aged thirty-one years, came to the Clinic Nov. 8, 1918, because of "stomach trouble;" a careful elicitation of the history disclosed relevant facts as follows: In 1910 the patient began to have periods of unexplained loss of appetite; during the following five years this periodic anorexia was a great annoyance. The symptom which finally brought him to the clinic, pain with an empty stomach, first manifested itself in 1915. For a short time after its onset the pain showed some periodicity, but during the greater part of the three years it has occurred daily. The patient described the pain as a cramp beginning in the right and in the left hypochondrium and radiating toward the midline of

the epigastrium, it was not associated with burning or with the usual subjective symptoms of hyperacidity, but occurred only when the stomach was empty. He further stated that the stomach seemed to empty very rapidly and that the period of freedom from cramps after the ingestion of food had become increasingly shorter. By frequent eating he had kept his distress at a minimum and his nutrition was practically normal. There had been no nausea or vomiting or evidence of gastric bleeding. The patient had been discharged from the army in 1917 on a diagnosis of pulmonary tuberculosis, and after five weeks in a sanitarium, home treatment was maintained until June, 1918.

The physical examination did not disclose any abnormal findings. There were no evidences of pulmonary lesion either clinically or by *x*-ray, and the Wassermann test was negative. The test-meal showed an absence of free hydrochloric acid and the presence of a considerable quantity of epithelium. This achylia explained in a measure the symptoms of which the patient complained, and considered with the character of the gastric pain and the fact that it had been continuous over a period of almost three years, practically excluded gastric or duodenal ulcer. The only clue which led to preoperative diagnosis, was secured by *x*-ray examination. The entire pyloric end of the stomach exhibited a diffuse mottled appearance, apparently well demarcated both at the pylorus, and at a line about four inches from the pylorus. Dr. Carman, after a re-ray, at which any possibility of complicating factors, such as the patient having taken food before the examination was excluded, made a diagnosis of gastric polyposis, and on this diagnosis the patient was sent to the hospital for exploration (Fig. 1).

The operation was done November 19 by Dr. Sistrunk. On inspection the stomach was found to be normal in appearance; on palpation, however, a soft, doughy, thickening of its wall extending from the pylorus to a line about five inches above was immediately evident, and although this did not

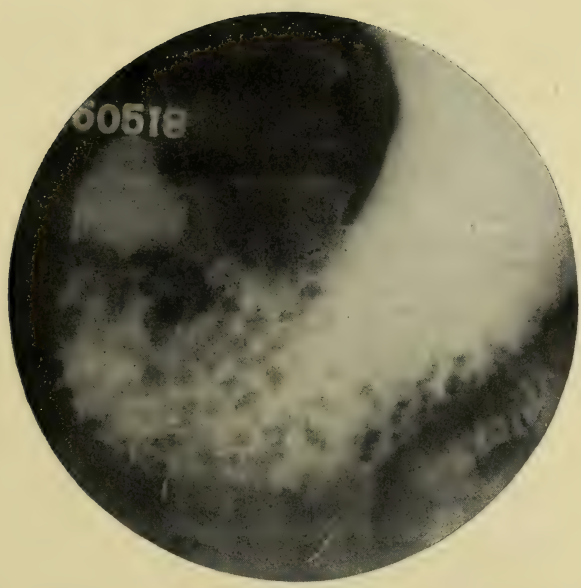


Fig. 1 (250518).—The mottled appearance (dark areas) in the roentgenogram are shadows due to the polypi in the stomach. See specimen, Figs. 2 and 3.

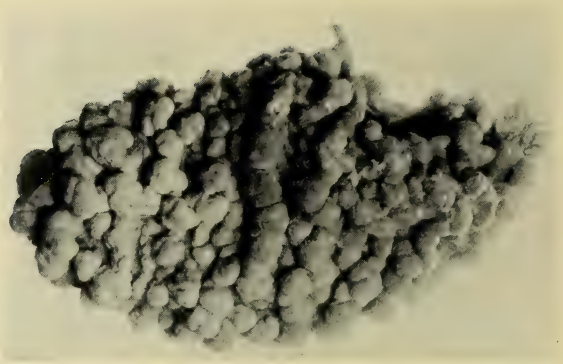


Fig. 2.—Photograph of specimen.

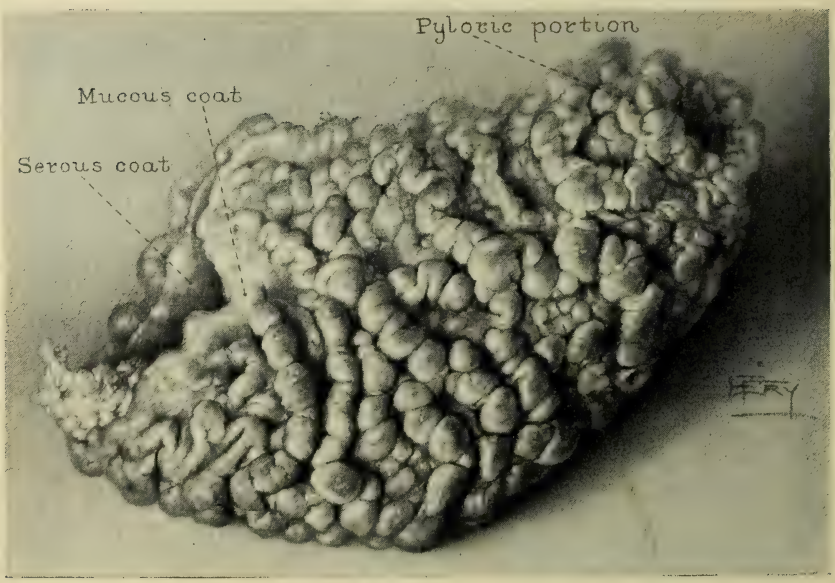


Fig. 3.—Polyposis of the stomach. Stomach turned inside out.

give the sensation of an actual tumor, the lines of demarcation were quite definite and corresponded with those apparent in the radiograph. Resection was carried out along these lines; about two-fifths of the stomach was removed. Continuity was reëstablished by the method which we have found most satisfactory, that is, ante-colic end (gastric) to side (jejunum) anastomosis. Immediate examination of the tumor showed a most typical example of the condition which has been described as gastric polyposis. Examination of the mucous membrane of the stump of the stomach showed that the polypoid changes did not entirely cease at the line of resection, and that small globular masses were present at various points on the mucous membrane, particularly along the summit of the rugæ, which in turn were very markedly hypertrophied. This finding created some uncertainty as to the ultimate result, but it is not unreasonable to hope that the removal of the greater portion of the diseased tissue will have a curative effect on the isolated tumors that were not removed.

Further study of the resected stomach revealed that it conformed to the type of polyposis which has been described by the French (Menetrier) as *polyadenomes polypeux*. The fresh specimen exhibited no changes except in the mucous membrane. No infiltration of the coats had taken place, and the specimen could readily be turned inside out. The mucous membrane was highly congested and tumors of various size were distributed over the entire surface. These tumors were globular and were arranged noticeably in rows in the transverse axis of the stomach; the masses were in close apposition to each other, as is shown in Miss Fry's drawing (Fig. 2). The intervening mucous membrane between the rows showed a few much smaller isolated globular elevations (Fig. 3). The great majority of the elevations were of the size of a hazelnut, and 250 of them could easily be counted; individually they were soft and velvety to the touch, and gave no macroscopic suggestion of malignancy or of destruc-

tion of tissue. A section of the gastric wall containing a tumor examined microscopically showed the bulk of the tumor to be composed of a tremendously hypertrophied mucous membrane. No hyperplasia of glandular element was of a character to suggest malignancy. The pathologists believe the condition is not malignant; this corresponds with the generally accepted view. The patient made a very satisfactory recovery, and returned to his home Dec. 16, 1918.

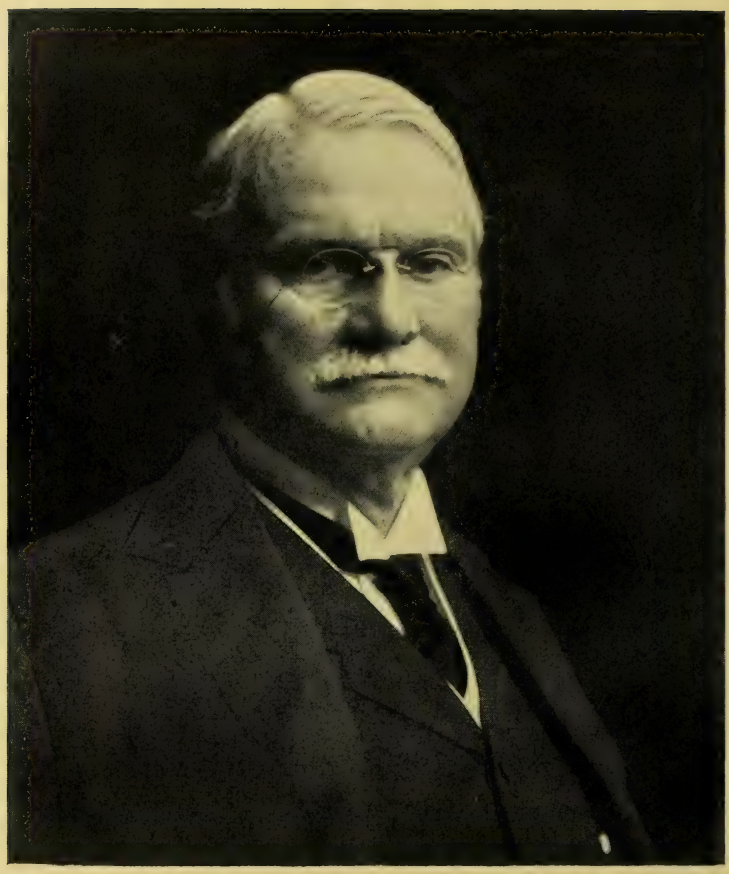
There are certain further facts pertaining to this case that are worthy of note. It is quite true that the condition would have been entirely unsuspected had it not been for the radiograph and its interpretation. In the only other typical case that has been described in this country (that of Myer) the preoperative diagnosis was also made by Dr. Carman. Other points meriting special emphasis in our case are that the condition has sufficient characteristics to be classified as a separate entity, and should not be confused with the single polypi or papillomatous masses occcasionally found in the stomach, and that of the collected cases in the literature, with the exception of two in which the patients were respectively thirty-four and thirty-eight years, all the patients were more than fifty-nine years. The fact that the patient, who exhibited a marked example of the condition, was only thirty-one years of age is not only unique but also is an excellent illustration of the opportunity which the advanced methods of gastric diagnosis available to the clinician of today afford in establishing an early diagnosis and carrying out prompt and intelligent treatment.

References

1. Campbell, A. M.: Benign tumors of the stomach. Surg., Gynec., and Obst., 1915, xx, 67–71.

2. Carman, R. D., and Miller, A.: The roentgen diagnosis of diseases of the alimentary canal. Philadelphia, Saunders, 1917, 241–243.

3. Myer, J. S.: Polyposis gastrica (polyadenoma). Jour. Am. Med. Assn., 1913, lxi, 1960–1965. Also: Tr. Am. Gastro-Enterol. Assn., 1913, xvi, 113–126.



DR. WILLIAM M. POLK

IN MEMORIAM

WILLIAM M. POLK, M.D.

1844–1918

William Mecklenburg Polk, son of Lieut. Gen. Leonidas and Frances Devereaux Polk, was born in Ashwood, Maury County, Tenn., August 15, 1844. His early education was obtained in Marion, Ala., and at St. James College, where he prepared for admission to Virginia Military Institute at Lexington, Va., then conducted under the personal direction of General Thomas J. (Stonewall) Jackson. There he pursued the mathematical and scientific course preparatory to admission to West Point. The war between the States interfered with his plans, so he began service in 1861 under General Jackson in Richmond as Drillmaster of the Virginia State troops. From April, 1861, to May, 1865, Dr. Polk was continually in active service.

In May, 1863, he had been appointed Assistant Chief of Artillery in Polk's Corps, and subsequently Captain in the Adjutant-General's Department. His position in the Confederate Army was such that he was often brought closely into contact with its leading figures. He knew Generals Albert Sidney Johnston, Joseph E. Johnston, Bragg, Beauregard, Hardee, Wheeler, and Forrest. A large part of his experience in the Confederate Army is interestingly recorded in a two-volume work which he wrote and published in memory of his father.

At the close of the war Dr. Polk accepted a position as Superintendent of the Brierfield Iron Works in Alabama, and while thus employed began the study of medicine under the direction of Dr. E. W. C. Bailey. He then attended the medical school of the University of Louisiana, now Tulane University, and in 1868 went to New York, where he continued his studies in the College of Physicians and Surgeons, from which he was graduated in 1869. Then he entered Bellevue Hospital as an interne and served the required eighteen months.

At the close of his service he received an appointment as one of the curators to the pathological department of the hospital, in which capacity he served a year and a half. Later he received an appointment as assistant demonstrator of anatomy in Bellevue Hospital Medical College and was advanced to the position of Professor of Materia Medica, Therapeutics and Clinical Medicine in the same institution.

In 1879 he was appointed Professor of Obstetrics and Diseases of Women in the Medical Department of the University of the City of New York. Meanwhile, in 1874, he had been appointed visiting physician to Bellevue Hospital, and in 1878 visiting physician to St. Luke's Hospital. He resigned this last position when he became professor to devote all his time to gynecological work in Bellevue, where, in conjunction with Dr. W. Gill Wylie and Dr. W. T. Lusk, he devoted himself to the creation of the large gynecological service which sprung up in the institution through the combined efforts of these three men. In 1890 Dr. Polk began to devote himself entirely to surgical gynecology, and since that time his professional labors have been entirely devoted to surgical operations upon women.

In 1898, when, through the interest of Colonel Oliver H. Pozen in higher medical education the medical department of Cornell University was inaugurated, Dr. Polk was selected as Dean of the Faculty. He also filled the chair of diseases of women in the same institution. At the end of his fourth

year he had succeeded in establishing a medical school which is now recognized as one of the leading institutions of its kind in America.

Dr. Polk was President of the New York Academy of Medicine from 1910 to 1914, and had been President of the American Gynecological Society, the New York Obstetrical Society, and Vice-President of the Continental Anglo-American Society of Paris. He was a member of the American Medical Association, the Southern Surgical Association, the Harvey Society, the Practitioners' Society, the Medical and Surgical Society, the Medical Society of the County of New York, the American College of Surgeons, the International Society of Surgery, the Société Obstetricale et Gynecologie of Paris, and the Royal Society of England.

He was President of the Aztec Association.

Dr. Polk was married November 14, 1866 to Miss Ida Ashe, of Demopolis, Ala., the daughter of Francis H. Lyon, for many years a Representative in Congress. She was the mother of Frank L. Polk, now Counsellor for the Department of State, and died some years ago. In 1914 Dr. Polk was married to Miss Marie H. Dehon, New York, who survives him.

Dr. Polk's death occurred on June 24, 1918, at Atlantic City, N. J., where he had gone for rest. He was in the seventy-fourth year of his age.

This recital of a splendid life, this catalogue of positions held and honors bestowed gives no adequate idea of the rare attractions and talents of the man. Sprung on both sides of his house from the oldest North Carolina ancestry, nursed in the cradle of gentle-folk in the daughter-state of Tennessee, reared under the influence of the best surroundings in Alabama both before and after the war, and educated largely in Virginia, he may be said to have represented, if any man ever did represent, all that was fine and true in the life of the Old South. Polk was a patrician in every fibre of his being, but he was of the strong and forceful sort,

believing in his fellowman and loving life to its depths. He was a tireless worker and possessed of tremendous energy, gifts possibly inherited from his distinguished father, the "Fighting Bishop" of the Confederacy.

Both before and since the Civil War a number of Southern medical men have risen to great eminence in New York City. The names of Sims, Thomas and Emmet stand out prominently and Polk must be added to those of Wyeth and Wylie who are now living. Dr. Polk was never sparing in his praise and admiration of his benefactor, the late Dr. John Metcalf, formerly of Mississippi, who in his prime was the great rival of Austin Flint, Sr., for the cream of New York's consulting practice. His patron was honored by Polk in that his younger son, who died just at the outset of a brilliant career in medicine, bore the name of John Metcalf Polk.

Polk's chief contributions to medical Science were in the domain of gynecological surgery. There was perhaps no man of his day who had a clearer conception of the principles underlying this art. Particularly was he sound in his judgments and correct in his conclusions, while as an operator he exhibited skill and resourcefulness. His understanding of womankind and his diplomatic management of their ailments were almost miraculous. Many are those now living and well to bless him for his wise and honest advice.

To all who came under his professional influence, Dr. Polk was kind, considerate and helpful, though demanding strict loyalty and accountability. Scores of younger men have known and felt his benefactions. None can ever forget him. Built in a big mould he was a big man, morally, mentally and physically—attractive, handsome, commanding. William M. Polk was born, lived and died a gentleman.

H. A. R.

DR. WILLIAM P. MATHEWS

WILLIAM P. MATHEWS, M.D.

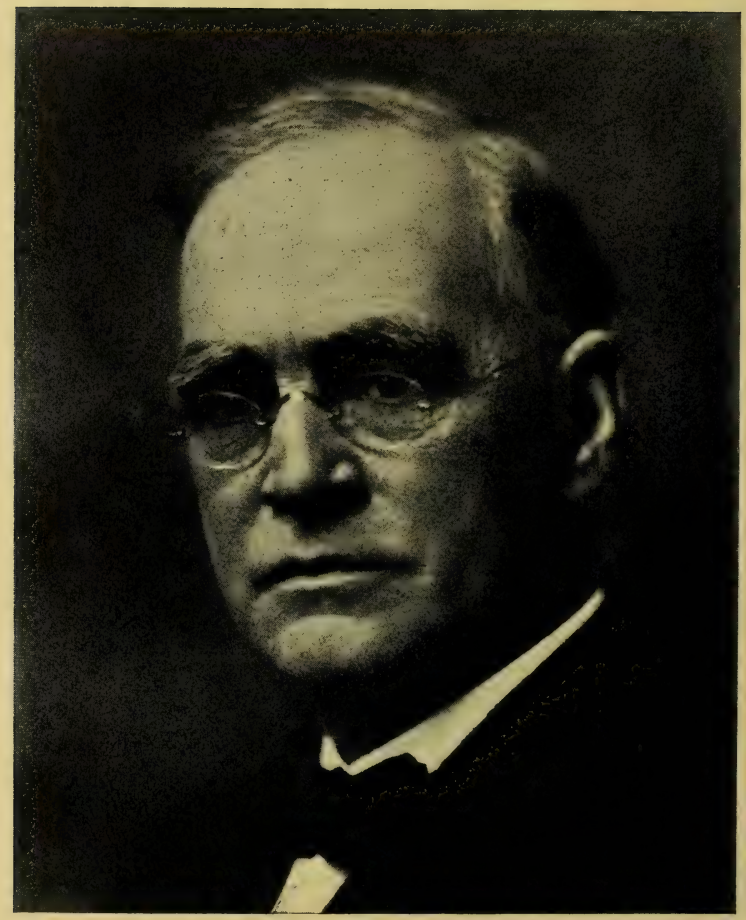
1868–1918

Our Fellow William Philip Mathews, aged fifty years and twenty-five days, died suddenly at his home in Richmond, Va., on July 25, 1918. He had been a resident of Richmond since he was six years old and was well known in medical, religious and social circles.

Dr. Mathews was born in Prince Edward County, June 30, 1868. He was the youngest son of the eminent physician, Dr. Thomas Philip Mathews. His mother was Bettie Bolling Marshall, daughter of Thomas R. Marshall, of Hampden-Sidney College. His grandfather was Captain William Mathews of Prince Edward County, a soldier of the War of 1812, and his great-grandfather was the Rev. Philip Mathews, a pious and devoted minister of the Baptist Church. Dr. Thomas Philip Mathews, the father of the deceased, having been a captain in the Confederate Army, and practiced his profession at Farmville for some time after the war, moved to Richmond in 1874. As a lad Dr. William Philip Mathews attended the public schools and afterward Richmond College, where he graduated in 1888. Embracing the profession of his father, he studied under his direction, entering the Medical College of Virginia, where he received his doctor's degree with the class of 1890.

The following year he spent as interne in Charity Hospital, New York City, and in 1891 returned to Richmond, where he was continuously in the practice of his profession until his

death. In fact, he was attending his patients as late as 9.30 o'clock the night before he died. He was connected with the Medical College of Virginia since 1891, when he was elected adjunct professor of surgery, he having specialized in orthopedics. In 1895 he was elected professor of anatomy, and in 1905 professor of orthopedic surgery. He was president of the board of health of Manchester for the year of 1900–1901 and was a director of the Manchester Light and Power Company. While engrossed in his professional duties, he was, nevertheless, interested in all that pertained to the common good, and is said to have neglected none of the duties of the good citizen.



DR. JAMES E. MOORE

JAMES E. MOORE, M.D.

1852–1918

Though among the eldest Fellows in point of years and on its roll only since 1910, James E. Moore will be sadly missed from the sessions of the Southern Surgical Association. His fine spirit, his unfailing courtesy and the genial warmth of his companionship endeared him to all. His younger colleagues especially will be deprived of his always well-chosen words of advice, his conservative but sound and energetic, views, expressed in papers and in discussions. Listening to him and associating with him one could but feel that Doctor Moore had guided his life by the light contained in that wonderful line of Lord Tennyson, "Knowledge comes but wisdom lingers."

Doctor Moore's career was a notable one. He was the first declared and exclusive specialist in surgery west of New York (1888); he was the first medical man in the Northwest to call attention to "osteomyelitis of the neck of the femur" (not correctly diagnosticated theretofore); he was characterized by the Medical School and Mayo Foundation of the University of Minnesota as "one of the four or five best teachers of surgery in the United States." Transplanted from the East to the West after his thirtieth year, he gained remarkable success quickly and surely.

Born in Clarksville, Pennsylvania, March 2, 1852, he attended the public schools of Pennsylvania, Poland Union Seminary (Ohio), the University of Michigan, and Bellevue Hospital Medical College, receiving his medical degree from

the latter college in 1873. He spent the next year in Fort Wayne, Ind., coming back to New York City for work in the wards of the hospitals. In 1876 he located in Emlenton, Pennsylvania, spending the next six years there in the arduous practice of a country physician. In August, 1882, he removed to Minneapolis. In 1885 he went abroad for study in Berlin and London, and on his return in the latter part of 1887 announced that he would devote his entire time to surgery.

He had been surgeon-in-chief to the Northwestern Hospital, Minneapolis, since 1887, and had been connected with the Medical School of the University of Minnesota since its establishment in 1888, when he accepted the position of Professor of Orthopedic Surgery. About 1896 he received the additional title of Professor of Clinical Surgery. In 1898 he resigned the position in orthopedic surgery, retaining the title of Professor of Clinical Surgery. In 1904 he was made Professor of Surgery, and in 1908 Chief of the Department of Surgery and of the Surgical Clinic in the University Hospital. We are told that "he held the respect and good-will of his associates and students." Judicial in his methods he was a real surgeon, not merely an operator.

After his retirement from private practice in 1915 he devoted himself to teaching and the work of the surgical clinic in the University Hospital. He was a member of the American Surgical Association, being its vice-president in 1905; Western Surgical Association, president in 1902; chairman of the Surgical Section of the American Medical Association in 1903; Fellow of the Southern Surgical Association; Fellow of the American College of Surgeons and member of its board of governors; member of the Société Internationale de Chirurgie, of the Sigma Chi fraternity and of the Minnesota Academy of Medicine.

Doctor Moore was possessed of a clear, vigorous style, both in speaking and writing. He was forceful, but never sensational; emphatic, but never dogmatic. He was the

author of chapters in various systems of surgery and had contributed over two hundred articles to surgical literature. In 1898 he published a treatise on orthopedic surgery.

Death came on November 2, 1918, of pernicious anemia after an illness of six months. An intimate associate feels that the extra burden of teaching which he willingly took upon himself to fill the gaps caused by the absence of most of his colleagues in war service broke down his health and caused his death. Thus passed a man full of years, full of deeds, full of honors. One of the very greatest of American surgeons writes of him: "Doctor Moore was a dear friend; a whole man—honest, upright and true; a loyal friend, free from petty jealousies. His memory will be with me during life and his example an inspiration."

H. A. R.

INDEX.

A

Address of the President, 1
Anuria after unilateral nephrectomy, 72
Appendicitis, chronic, 156
    transplantation of, 59
Ashford, B. K., evacuation of the wounded, 253

B

Balfour, D. C., polyposis of the stomach, 369
Black, W. T., diverticula of the intestines, 121
Bladder, irritable, in women, 46
Bloodgood, J. C., epidemics of pneumonia, 186
    examination of service registrants, 251
    mustard gas burns, 251
    surgery of the intestines, 142
    treatment of tumors of the upper jaw with the cautery, 210
        of undescended testis, 95
Bonifield, C. L., reconstruction of the uterus, 297
    ultimate results of prolapsus uteri, 315
    visceroptosis, 340
Bovée, J. W., gynecological pelvic drainage, 325, 331
    ultimate results of prolapsus uteri, 312
Burnam, C. F., radium demonstration at the Howard A. Kelly Hospital, 193
    treatment of Hodgkin's disease, 204

C

Carothers, R. C., epidemics of pneumonia, 189
    visceroptosis, 353
Carr, W. P., a gauze sponge expelled from the bladder, 70
    mustard gas burns, 243
    surgery of the intestines, 151

Carr, W. P., undescended or maldescended testis, 99
Cecum and ascending colon, resection of the, 131
Cesarean section, limitations of, 333
Clark, J. G., ultimate results of prolapsus uteri, 299, 319, 320
Coley, W. B., surgery of the intestines, 150
    treatment of undescended or maldescended testis, 79, 100
    tumors of the upper jaw, 225
Colostomies, practical permanent, 139
Cullen, T. S., a gauze sponge expelled from the bladder, 68
    suture of ruptured kidney, 16
Curettement before suturing the uterus in Cesarean section, 332

D

Deaver, J. B., pancreatic lymphangitis, with and without jaundice, 102
Diverticula of the intestines, 121
Downes, W. A., epidemics of pneumonia, 188

E

Evacuation of wounds, 234
Examination of selective service registrants, 234

F

Fistula, duodenal, 160
Frank, L., anuria after unilateral nephrectomy, 72

G

Gall-bladder, papilloma of the, 116
Gerster, J. C. A., osteochondroma of the ribs, 362
Goitre, surgical treatment of, 171
Gunshot injury of the musculospiral nerve, 355
Gynecological pelvic drainage, 325

H

Hall, R. B., prostatectomy, 44
Harrington, S. W., ectopic or ruptured kidney, 19
Hendon, G. A., duodenal fistula, 169
    examination of service registrants, 250

Hendon, G. A., mustard gas burns, 250
prostatectomy, 44
Hodgkin's disease, 204
Horsley, J. S., gynecological pelvic drainage, 330
resection of the cecum and the ascending colon, 131, 153
undescended or maldescended testis, 97
Hunner, G. L., irritable bladder in women, 57
transplantation of the appendix, 61

I

In Memoriam:
Mathews, William P., 377
Moore, James E., 379
Polk, William M., 373

J

Jonas, E., papilloma of the gall-bladder, 119
surgical treatment of goitre, 177
ultimate results of prolapsus uteri, 320
Judd, E. S., ectopic or ruptured kidney, 19

K

Kelly, H. A., mechanism of labor and types of pelves, 291
radium demonstration at the Howard A. Kelly Hospital, 193, 195
ultimate results of prolapsus uteri, 316, 318
Kidney, ectopic or pelvic, 19
suture of ruptured, 13

L

La Roque, G. P., a gauze sponge spontaneously expelled from the urinary bladder, 64
Lantsberry, W., radium demonstration at the Howard A. Kelly Hospital, 193, 194
Ledbetter, S. L., surgical treatment of goitre, 177
suture of ruptured kidney, 13, 18
Lewis, Jr., B., irritable bladder in women, 58
prostatectomy, 29, 44

M

McCallum, W. G., pathological studies in the recent epidemics of pneumonia, 180, 189
McGlannan, A., examination of selective service registrants, 234, 252
MacCarty, W. C., papilloma of the gall-bladder, 118
Marcy, H. O., a gauze sponge expelled from the bladder, 70
    art and science of surgery, 259
    examination of service registrants, 249
    mustard gas burns, 249
    papilloma of the gall-bladder, 119
    surgical treatment of goitre, 178
Moore, J. T., surgery of the intestines, 152
    undescended or maldescended testis, 100
    ultimate results in prolapsus uteri, 320
Moran, J. F., hand method for demonstrating the mechanism of labor and types of pelves, 288, 291
Morris, L. C., suture of ruptured kidney, 17
Morris, R. T., chronic appendicitis, 156, 158
    prostatectomy, 41
Mustard gas burns, 243
Mixter, S. J., epidemics of pneumonia, 184
    surgery of the intestines, 145
    surgical treatment of goitre, 176
    undescended or maldescended testis, 97

N

Norris, C. C., ultimate results of prolapsus uteri, 299

O

Oliver, J. C., epidemics of pneumonia, 185
Osteochondroma of the ribs, 362

P

Pancreatic lymphangitis, 102
Peck, C. A., treatment of war wounds in the hospitals of the American expeditionary forces, 227
Pelves, types of, and mechanism of labor, 288
Pneumonia, epidemics of, 180
Polyposis of the stomach, 369

Porter, M. F., surgical treatment of goitre, 160, 168
suture of ruptured kidney, 16
ultimate results of prolapsus uteri, 318, 319
undescended or maldescended testis, 97
President, address of, 1
Prolapsus uteri, ultimate results of, 299
Prostatectomy, 29

R

Reder, F., prostatectomy, 42
surgery of the intestines, 144
unusual gunshot injury of the musculospiral nerve, 355
Reed, C. A. L., irritable bladder in women, 46, 58
surgery of the intestines, 146
visceroptosis, 349
Robins, C. R., reconstruction of the uterus, 292
ultimate results of prolapsus uteri, 313
Rosser, C. M., chronic appendicitis, 158
surgery of the intestines, 149
surgical treatment of goitre, 176
transplantation of the appendix to supply an absent urethra, 59, 62

S

Seelig, M. G., epidemics of pneumonia, 187
surgery of the intestines, 152
Selective service registrants, 234
Sistrunk, W. E., practical permanent colostomies, 139
surgery of the intestines, 149
undescended or maldescended testis, 98
Sponge, gauze, expelled from the bladder, 64
Standardization of rural hospitals, 1
Stone in the common duct, 108
Stone, I. S., gynecological pelvic drainage, 331
standardization of rural hospitals, 1
transplantation of the appendix, 61
ultimate results in prolapsus uteri, 320
Surgery, art and science of, 259

T

Testis, treatment of undescended or maldescended, 79
Thompson, J. E., prostatectomy, 43
tumors of the upper jaw, 223

Torrance, G., curettement before suturing the uterus in Cesarean section, 332
Tumors of the upper jaw, treatment of, with the cautery, 210

U

Undescended testis, 99
Unilateral nephrectomy, 72
Uterus, reconstruction of, 292

V

Visceroptosis, 340

W

War wounds, treatment of, 227
Waring, T. P., malignant papilloma of the gall-bladder, 116, 120
Wathen, J. R., prostatectomy, 40
surgical treatment of goitre, 174
Williams, J. W., mechanism of labor and types of labor, 291
Willis, A. M., stone in the common duct, 108
Wounded, evacuation of the, 253

Z

Zinke, E. G., limitations of Cesarean section, 333